REPORT ON THE DEEP-SEA MADREPORARIA OF THE SIBOGA-EXPEDITION

Siboga-Expeditie
XVIa

REPORT ON THE DEEP-SEA MADREPORARIA OF THE SIBOGA-EXPEDITION

BY

A. ALCOCK, M.B., LL.D., F.R.S.
Indian Medical Service, corresponding Member of the Zoological Society and Fellow of the Geological Society of London. Superintendent of the Indian Museum and Professor of Zoology and Comparative Anatomy in the Medical College of Calcutta. Sometime Surgeon-Naturalist to the Indian Marine Survey.

With five plates

LATE E. J. BRILL
PUBLISHERS AND PRINTERS
LEYDEN — 1902

REPORT ON THE DEEP-SEA MADREPORARIA OF THE SIBOGA-EXPEDITION

BY

A. ALCOCK, M.B., LL.D., F.R.S.
Indian Medical Service, corresponding Member of the Zoological Society and Fellow of the Geological Society of London. Superintendent of the Indian Museum and Professor of Zoology and Comparative Anatomy in the Medical College of Calcutta. Sometime Surgeon-Naturalist to the Indian Marine Survey.

With five plates.

INTRODUCTION.

When my friend Professor MAX WEBER suggested that I should deal with the Deep-sea Madreporaria collected by the "Siboga" Expedition in the East Indian Archipelago, I assented readily, because I fancied that the species inhabiting the deep basins of that part of the Oriental Region would be much the same as those found in the depths of the seas of India, to which I have given some study. Had I known, however, that the correspondences between representative collections from the deep-seas of the two regions would amount to less than ten per cent of their sum, I should have been much more diffident as to my qualifications for the proposed task.

Another unexpected difficulty, with which I was confronted, was that the "Siboga" collection contained, along with many forms that indisputably belong to the abysses, a large number of other "free" forms — such, *e. g.*, as the species of *Heterocyathus*, *Heteropsammia*, and *Balanophyllia* — which, though they have no connexion with the peculiar fauna of the deep sea, yet most emphatically cannot be classed with the reef-forming corals.

This at once raised the question, which I could have been well content to leave more experienced zoophytologists to discuss, as to where, in the case of Corals, the limits of the deep-sea fauna should be drawn.

Some writers have avoided this difficulty by including as Deep-sea Madreporaria all

those species — for the most part solitary in habit — which do not help to form reefs. Now this simple method of dealing with the matter may serve well enough for some latitudes, but it will not answer for tropical latitudes where the temperature, even at a depth of a hundred fathoms, is fairly high.

For, at any rate in the Oriental region, everyone who has worked in the field knows that, outside the zone of reef-forming corals, there are two separate coral faunas. One of these is a characteristic local assemblage of small solitary species of *Eupsammidæ*, *Lophoseridæ*, and *Turbinolidæ*, that flourish on shelly and shingly ground in depths of twenty to sixty fathoms or thereabouts, where the water is still warm; while the other includes a number of true cold-water forms having decided affinities with the corals living in the depths of the North Atlantic and with those that inhabited the Mediterranean basin in Tertiary times.

These two assemblages of Madreporaria — the one of small tropical species that are now invading the depths: the other of well-established abyssal species having a more northern, or at any rate a more cosmopolitan, cast — are quite distinct, even though a few of the deep-sea species, such for instance as *Bathyactis*, do occasionally find their way into shallow water.

So far as the "Siboga" material is concerned, I have ventured, with Prof. MAX WEBER'S assent, to settle the matter by applying to the non-reef-forming corals the same measures that have been found convenient for so many other groups of marine animals, and I have therefore separated, as worthy of independant treatment with regard to questions of oceanography, all those species that ordinarily live below the hundred-fathom line.

These species are here collected under the name of Deep-sea Madreporaria. The remainder of the collection I hope to deal with hereafter as "Solitary Madreporaria of the Prope-littoral Zone".

The number of true deep-sea species included in the present instalment is 75, belonging to 29 genera and subgenera and 5 families.

Of the species that are sufficiently well preserved for determination 38 have never, to the best of my belief, been previously described, except in a preliminary communication published in the Journal of the Netherland Zoological Society.

Among these undescribed species there are a few for which new generic definitions have had to be proposed. These new genera are (1) *Lochmæotrochus*, which is essentially a Conotrochus that forms small colonies by budding; (2) *Citharocyathus*, which appears to show a line of connexion between Deltocyathus and Nototrochus; and (3) *Placotrochides*, which seems to connect Placotrochus and Platytrochus.

Several of these deep-sea species, described as new, have however a very close resemblance to species, described by SEGUENZA, from the Sicilian and Calabrian Tertiary rocks, and may perhaps prove to be identical with them.

Several species that range across the Atlantic and into East Indian waters, most of them also occuring in a fossil state in the Tertiary Deposits of Southern Europe, are found amongst the "Siboga" material, such as *Deltocyathus italicus* Michelotti, *Desmophyllum cristagalli* E. & H., *Flabellum laciniatum* Philippi (a variety), *Amphihelia oculata* Linneus and *Amphihelia ramea* Müller.

Among other curiosities — or, as I prefer to regard them, weighty and suggestive facts — of geographical distribution, must be mentioned that of the singular Amphihelia-like Eupsammid *Dendrophyllia (Coenopsammia) profunda*, which was discovered by POURTALÈS in deep water among the West Indian Islands, and which we now find flourishing in the depths of the Sea of Banda, in proximity to two other strange Oculina-like Eupsammids. This species has also, quite recently, been discovered by the "Investigator" in deep water off Ceylon.

The cosmopolitan *Bathyactis symmetrica* Pourtalès is of course present in the collection, and also illustrates its well-known elasticity of bathymetric range, having been dredged at the one extreme in 289 metres (Station 12) and at the other extreme in 1886 metres (Station 208).

The almost infinite adaptability to pressure conditions of *Bathyactis symmetrica* Pourtalès is shared by its congeners *Bathyactis stephana*, which ranges from 69 to 1301 metres, and *Bathyactis Sibogae*, which ranges from 522 to 1914 metres. *Deltocyathus lens*, a small new Turbinoloid species, can accomodate itself with almost equal ease, having been dredged, on the one hand, at 390 metres and, on the other hand, at 4914 metres.

Four other peculiarly adaptable species, which show the transition between the deep-sea and what I propose to call the deep prope-littoral zone, may here be mentioned. They are *Deltocyathus magnificus* Mosely (522 to 15 metres), *Tropidocyathus lessoni* Michelin (390 to 69 metres), *Trochocyathus caryophylloides* (304 to 15 metres), and *Flabellum distinctum* E. & H. There are no hard and fast boundary-lines in Nature, and I do not think that the extensive bathymetric range of any of these species invalidates the distinction, emphasized in this Report, between the veteran fauna of the deep sea and the recruiting ground of the prope-littoral zone.

The southern end of the Sulu Sea seems to be one of the richest places in the world for deep-sea corals. At seven stations close together, between the parallels of 5° 43′ and 6° 15′ N. and the meridians of 119° 40′ and 121° 28′ E. and the depths of 270 and 1270 metres, no less than 32 species representing 18 genera were dredged by the „Siboga". At one single station of these seven (Station 95, 522 metres) 22 species of 14 genera came up at one haul. Hardly less fertile is the neighbourhood of the Kei Islands in the Banda Sea, where the "Siboga" dredged many of the species described by MOSELEY from the "Challenger" collection. When it is remembered that some of these teeming coral-grounds support prolific branching forms like *Amphihelia*, we may well imagine that in the depths of some of the tropical seas actual submarine coral-reefs may be forming. This idea is supported by the facts mentioned in the Report on the "Investigator" deep-sea Madreporaria, that at a depth of 430 fathoms off the Malabar coast nearly half a ton of deep-sea corals were brought up at a single haul of the dredge; and that at a depth of 1000 fathoms, in the Laccadive Sea, over two hundred specimens of a large species of *Caryophyllia* were netted in a haul of no long duration.

No tremendous hauls of this sort appear to have been made in the course of the "Siboga" expedition, but, on the other hand, the basins explored by the "Siboga" are vastly richer in species than the depths of the seas of the western part of the Oriental Region explored by the "Investigator".

II. LIST OF AUTHORS CONSULTED.

AUTHORS EARLIER THAN MILNE EDWARDS AND HAIME ARE NOT INCLUDED.

AGASSIZ, A. Three Cruises of the Blake, Vol. II. p. 148 *et seq.* Bulletin of the Museum of Comparative Zoology. Harvard, Vol. XV. 1888.

ALCOCK, A. On Some Newly-recorded Corals from the Indian Seas. Journal of the Asiatic Society of Bengal, LXII. pt. 2. 1893.

—— On Some New and Rare Corals from the Deep Waters of India. *Act. cit.* LXIII. pt. 2. 1894.

—— An Account of the Deep-Sea Madreporaria collected by the Royal Indian Marine Survey Ship Investigator. Calcutta, 1898.

BASSÉT-SMITH, P. W. Report on the Corals from the Tizzard and Macclesfield Banks, Annals and Magazine of Natural History (6) VI. 1890.

DANA, J. D. United States Exploring Expedition. Zoophytes. Philadelphia, 1848.

D'ARCHIAC et HAIME. Animaux Fossiles du Groupe Nummulitique de l'Inde. Paris, 1853.

DENNANT, J. New Species of Corals from the Australian Tertiaries. Transactions and Proceedings of the Royal Society of South Australia. XXIII. 1898—99 and XXV. 1901.

DUNCAN, P. MARTIN. Fossil Corals and Echinoderms from the South Australian Tertiaries. Annals and Magazine of Natural History (3) XIV. 1864.

—— Report on the "Porcupine" Madreporaria. Proceedings of the Royal Society. 1870.

—— Madreporaria dredged up during the Expedition of H. M. S. Porcupine. Transactions of the Zoological Society. VIII. 1873—74 and X. 1878—79.

—— Deep Sea and Littoral Corals. Proceedings of the Zoological Society, 1876.

—— Monograph of the Fossil Corals of Sind. Palæontologia Indica, ser. VII and XIV. Vol. I. Part 2, 1880.

—— Recent Corals from Madeira. Proceedings of the Zoological Society, 1882.

—— Remarks on Actinology of the Atlantic Ocean. Annals and Magazine of Natural History, series 5. Vol. XII. 1883.

—— A Revision of the Families and Genera of the Sclerodermic Zoantharia or Madreporaria. Journal of the Linnean Society, Zoology, XVIII. 1884—85.

—— On the Madreporaria of the Mergui Archipelago. Journal of the Linnean Society, XXI. 1886—89.

DUCHASSAING, P. et MICHELOTTI, J. Memoire sur les Coralliaires des Antilles. Mem. Accad. Sci. Torino, Classe di Fis. et Mat. ser. 2ª. XIX. 1860.

GARDINER, J. STANLEY. On Turbinolid and Oculinoid Corals from the South Pacific. Proceedings of the Zoological Society, 1898.

—— On the Solitary Corals collected by Dr. A. Willey. Willey's Zoological Results. Cambridge, 1899.

—— On the Anatomy of a supposed new Species of *Coenopsammia* from Lifu. Willey's Zoological Results Part IV, Cambridge, 1899.

HEIDER, A. R. VON, Korallenstudien. Zeitschrift für wissenschaftliche Zoologie, Bd. LI. 1891.

JOURDAN, E. Zoanthaires provenant des campagnes du yacht l'Hirondelle. Monaco, 1895.

KENT, W. SAVILLE. On some new and little-known Species of Madrepores. Proceedings of the Zoological Society, 1871.

—— Madreporaria from the Coast of Spain and Portugal. Annals and Magazine of Natural History (4) VI. 1870.

LACAZE-DUTHIERS, H. Evolution du Polypier du Flabellum anthophyllum. Archives de Zoologie Expérimentale. (3) II. 1894.

—— Faune du Golfe du Lion, Corailliaires. Archiv. de Zool. Expérim. (3) V. 1897.

LINDSTROM, G. Contributions to the Actinology of the Atlantic Ocean. Kongliga Svenska Vetenskaps-Akad. Handlingar. Bd. XIV. N° 6, 1877.

—— A Reply to Remarks of Prof. Duncan, Annals and Magazine of Natural History, ser. 5, Vol. XIII. 1884.

—— On Thecocyathus, etc. Ofversigt Kongl. Vetenskaps-Akad. Förhandlingar 1900 (1901).

MARENZELLER, E. VON. Ueber einige japanische Turbinoliiden. Annalen des K.K. Naturhistorischen Hofmuseums, Bd. III. 1888.

—— Ueber das Wachsthum der Gattung Flabellum. Zoologische Jahrbücher, Systematik u. s. w. Abth. Bd. III. 1888.

MILNE EDWARDS H. et HAIME, J. Monographie des Turbinolides, Annales des Sciences Naturelles (3 sér.) Zoologie, IX, 1848. Monographie des Eupsammides, *act. cit.* X. 1848. Monographie des Oculinides, *act. cit.* XIII. 1850.

—— Histoire Naturelle des Coralliaires, tom. II. 1857, tom. III. 1860.

MOSELEY, H. N. A New Species of Simple Coral. Proceedings of the Zoological Society. 1880.

—— Report on the Deep Sea Madreporaria dredged by H. M. S. Challenger. 1881.

ORTMANN, A. Studien über Steinkorallen. Zoologische Jahrbücher, Systematik u. s. w. Abth. Bd. III. 1888.

OSASCO, E. Corallari Pliocenici del Piemonte etc. Atti della R. Accademia di Torino, XXXI. 1895—96. Corallari Miocenici del Piemonte, *act. cit.* XXXII. 1896—97. Corallari Oligocenici del Piemonte, *act. cit.* XXXIII. 1897—98.

POURTALÈS, L. F. DE. Contributions to the Fauna of the Gulf Stream at great depths. Bulletin of the Museum of Comparative Zoology. Harvard I. 1863—69.

—— Illustrated Catalogue of the Museum of Comparative Zoology, Harvard. N° IV. Deep Sea Corals, 1871. — N° VIII. Deep-Sea Corals, 1874.

—— Reports on the Dredging Operations of the U. S. Coast Survey Steamer Blake: Corals. Bull. Mus. Comp. Zool. Harvard V. 1878—79, and VI. 1879—80.

REHBERG, H. Neue und wenig bekannte Korallen. Abhandlungen aus dem Gebiete der Naturwissenschaften etc. Hamburg, Bd. XII. 1892.

SARS, G. O. On Some Remarkable Forms of Animal Life from the Great Deeps off the Norwegian Coast. Christiania, 1872.

SCLATER, W. L. On a New Madreporarian Coral. Proceedings of the Zoological Society, 1886.

SEGUENZA, G. Corallarii Fossili della Rocca Terziarie del Distretto di Messina. Memorie della Reale Accademia delle Scienze di Torino (Fis. e Mat.) ser. 2. XXI. 1864.

SEMPER, C. Ueber Generationswechsel bei Steinkorallen u. s. w. Zeitschrift für wissenschaftliche Zoologie. Bd. XXII. 1872.

STUDER, TH. Steinkorallen auf der Reise S. M. S. Gazelle gesammelt. Monatsberichte der Köngl. Preussischen Akademie zu Berlin, (1877) 1878.

TENISON-WOODS, J. E. On the Extra-tropical Corals of Australia. Proceedings of the Linnean Society of New South Wales, II. 1878.

THOMSON, C. WYVILLE. The Depths of the Sea. London, 1873.

VAUGHAN, T. WAYLAND. A New Genus and Species of Turbinolid Coral from Japan. Proceedings of the United States National Museum, Vol. XXII. 1900.

—— List of Papers on Recent and Fossil Stony Corals. Sammlungen des Geologischen Reichs-Museums in Leiden, ser. 2, Bd. II. Heft 1, 1901.

VERRILL, A. E. Synopsis of North Pacific Polyps and Corals. Proceedings of the Essex Institute, V. 1866—67, (Communications p. 17).

—— Review of the Corals and Polyps of the West Coast of North America. Transactions of the Connecticut Academy I. pt. 2. 1867—71.

—— New and Imperfectly-known Echinoderms and Corals. Proceeding of the Boston Society of Natural History, XII. 1868—1869.

—— Descriptions of New Corals. American Journal of Science, 2nd ser. XLIX. 1870.

—— Marine Fauna of the Eastern Coast of North America. American Journal of Science, 3rd ser. XVI. 1878.

—— Marine Fauna off the South-eastern Coast of New England. American Journal of Science, 3rd ser. XXIX. 1885.

III. SYSTEMATIC ACCOUNT OF THE SIBOGA DEEP-SEA MADREPORARIA.

MADREPORARIA APOROSA Edw. & H.

I. Family TURBINOLIDÆ Edw. & H.

Twenty genera, including subgenera, of this family are represented in the collection.

I. **Caryophyllia** Lamk., Stokes, Duncan.

The collection contains specimens of seven species of this genus, one of which however is represented only by dead and worn specimens that are hardly identifiable. There are besides, from Station 159, some dead fragments of what may be a *Caryophyllia*.

Synopsis of the Siboga *Deep Sea species of* Caryophyllia.

I. Corallum free, cornute, septa in six systems and four complete cycles:
  1. Costæ thin and sinuous, those of the first two cycles peculiarly salient and trenchant. . . . . 1. *C. cultrifera.*
  2. Costæ mere granular striations, except in young specimens, in which those of the first two cycles are broad and angular. . . . . 2. *C. scobinosa.*

II. Corallum fixed:
  1. Septa in six systems and four complete cycles:
    I. Septa of the fourth cycle larger and very much more exsert than those of the third. . . . . 3. *C. panda.*
    II. Septa of third and fourth cycles almost equal. . . . . 4. *C. ephyala.*
  2. A fifth cycle present in some of the systems, thecal wall with transverse undulating accretion ridges. . . . . 5. *C. transversalis.*
  3. Septa having the appearance of *five* systems of four regular and complete cycles. . . . . 6. *C. quadragenaria.*

1. *Caryophyllia cultrifera* n. sp. Plate I. Fig. 1, 1*a*.

Stat. 101. 6° 15′ N., 120° 21′ E. 1270 m. 1 Ex.

In form this species much resembles *C. communis* Seg. and *C. ambrosia* mihi, but differs

from both in the enormous size of the septa and remarkable prominence and sharpness of the costæ of the first two cycles. The septa of these two cycles are even larger than those of *C. (Ceratocyathus) zanclæa* and *compressa* Seg.

Corallum unattached, curved and slightly twisted, hardly compressed.

Costæ very thin, sinuous, those of the first two cycles extremely prominent and trenchant.

Septa thin, wavy, denticulate, 48 in number in six regular systems: those of the first two cycles are equal, and are of enormous size and greatly exsert: those of the fourth cycle are a little larger and very much more exsert than those of the third: the surfaces of all are rather distantly papillose.

Pali large, strongly sinuous, strongly but bluntly denticulate, 12 in number and placed opposite the septa of the third cycle.

The columella consists of three or four broad curly ribbons.

Soft parts brownish-yellow: corallum snow-white with a thin brownish epitheca.

Greatest height of corallum	28	millim.
Major diameter of calicle	22	„
Minor „ „ „	20	„

2. *Caryophyllia scobinosa* n. sp. Plate I. Fig. 2, 2*a*.

Stat. 45. 7° 24′ S., 118° 15′.2 E. 794 m. 3 Ex.
Stat. 102. 6° 4′.1 N., 120° 44′ E. 535 m. 3 Ex. (small).

This species also is related to *C. communis* Seg. and even more nearly to *C. pumila* Seg.

Corallum unattached (except when young) curved, hardly compressed.

The costæ in the larger specimens are merely discontinuous striations amid a field of close-set but discrete miliary granules, but in the smaller specimens angular costæ corresponding with the first two cycles of septa are very distinct, at least on the convex curve of the corallum.

Septa thin, 48 in number in six regular systems: those of the first two cycles, which are equal, are conspicuously large and exsert: those of the 4th cycle are about the same size as, but are a little more exsert than, those of the 3rd: the surfaces of all are denticulate, and the edges, within the calicular fossa, a little sinuous.

Pali strongly sinuous, bluntly denticulate, 12 in number and placed opposite the septa of the third cycle.

Columella of a few broad twisted ribbons, small.

Soft parts brownish-yellow: corallum white, but much discoloured on the outside below the calicular margin.

Greatest height of corallum	20	millim.
Major diameter of calicle	16.5	„
Minor „ „ „	13.5	„

3. *Caryophyllia panda* n. sp. Plate I. Fig. 3, 3*a*.

Stat. 177. 2° 24′.5 S., 129° 38′.5 E. 1633 m. 1 Ex.

This species is closely related to *C. arcuata* Edw. & H. and to *Caryophyllia* (not *Ceratocyathus*) *zanclæa* Seg., also to *C. ephyala* mihi, from all of which it differs in having the septa of the fourth cycle larger and very much more exsert than those of the third.

Corallum curved, moderately compressed, expanding from a stout pedicle which is attached by a broad encrusting base, the thecal wall is finely granular, the costæ showing as fine striæ.

Septa stout, 48 in number in six regular systems, those of the first two cycles are equal and are conspicuously large and exsert, those of the fourth cycle are larger and much more exsert than those of the third: the surfaces of all are denticulate.

Pali large, flexuous, 12 in number placed opposite the septa of the third cycle; their surface is strongly but bluntly denticulate.

The columella consists of two or three curling ribbons.

The corallum is glistening white.

Greatest height of corallum about	35	millim.
Major diameter of calicle	19	„
Minor „ „ „	15	„

4. *Caryophyllia ephyala* Alcock.

Caryophyllia ephyala Alcock. Annals and Magazine of Natural History, Jan. 1891, p. 6. Investigator Deep-Sea Madreporaria, p. 13, pl. I. figs. 4, 4*a*.

Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390 m. 1 dead Ex.
Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 1 dead Ex.
Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. 2 Ex.

The two specimens from Station 251 and that from Station 95, though they do not agree in every detail with the specimens from the Andaman and Laccadive Seas, are not to be separated from them. The differences appear to be due partly to age, and partly to slight malformation in one specimen.

Distribution: Laccadive Sea, Andaman Sea, Banda Sea.

5. *Caryophyllia* sp. (an *clavus?*).

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 7 Ex., dead and worn.
Stat. 100. 6° 11′ N., 120° 37′.5 E. 450 m. 3 Ex., dead and worn.
Stat. 259. 5° 29′.2 S., 132° 52′.5 E. 487 m. 1 Ex., dead.

These specimens are all dead and worn and are not identifiable with certainty, but they are extremely like *C. clavus*.

6. *Caryophyllia clavus* var. *transversalis* Moseley.

Caryophyllia clavus var. *transversalis* Moseley. Challenger Deep-Sea Madreporaria, p. 134. pl. I. figs. 2, 2*a*.

Stat. 12. 7° 15′ S., 115° 15′.6 E. 289 m. 1 Ex.
Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397 m. 3 Ex.

The Challenger specimens were dredged off the Kei Islands, on almost the exact spot of Siboga Station 256.

7. *Caryophylla quadragenaria* n. sp. Plate I. Fig. 4, 4*a*.

Stat. 90. 1° 17′.5 N., 118° 53′ E. 281 to 54 m. 1 Ex.
Stat. 251. 5° 28′.4 S., 132° 0.2′ E. 204 m. 1 Ex.
Stat. 289. 9° 0′.3 S., 126° 24′.5 E. 112 m. 1 Ex.

Allied to *C. cylindracea* Reuss, *C. abyssorum* Duncan and *C. antillarum* Pourtalès.

Corallum rather elongate, little compressed, gradually and elegantly expanding from a curved, very short, rather slender cylindrical peduncle with an incrusting base.

The costæ, whose granular surface is glazed over by a thin vitreous epitheca, are equal; they are very distinct at the calicular orifice, and thence gradually become less salient until they are lost on the pedicle.

Septa exsert, 40 in number, arranged with perfect regularity in what appears to be *five* systems of four complete cycles; their surfaces are finely denticulate, and their edges inside the calicular fossa are wavy. Those of the first two cycles, which are equal, are much the largest and most exsert, dividing the calicle into ten perfectly equal compartments; those of the fourth cycle are a little larger and a good deal more exsert than those of the third.

Pali 10 in number, opposite the septa of the third cycle: they have the form of large upstanding curls, just like the ringlets that compose the columella of most Caryophylliæ.

Columella large, rather deep-seated, made up of numerous cincinni.

The thecal wall is stained with purple-brown near the calicular margin, beyond which it has a striated appearance owing to the costæ being alternately darker and lighter.

Greatest height of corallum	15	millim.
Major diameter of calicle	10	„
Minor „ „ „	8	„

Another specimen of this species was dredged in 112 metres water at station 289.

II. **Ceratotrochus** Edw. & H., Duncan.

The collection contains three species which may be referred to this genus. One of them, from Station 102, is represented by broken specimens to which I am reluctant to give a name that may be a stumbling-block to future systematists; while another, from Station 159, is a mere relic which has even less right to a specific name, for it might equally well be regarded as a worn and weathered *Trochocyathus*.

8. *Ceratotrochus venustus* n. sp. Plate I. Fig. 5, 5*a*.

Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397 m. 1 Ex.

The corallum is unattached, acutely conical, straight, a little compressed, thick-walled.

Costæ equal, in the form of very thin microscopically-serrate carinæ, which extend from the calicular margin to the acuminate base.

Calicular orifice horizontal, the fossa deep. Septa in six systems and five cycles, the fifth cycle being undeveloped in two of the half-systems. Those of the first cycle are pre-eminently large and exsert, besides being thicker than the others; those of the other four cycles diminish successively in size and exsertion from the 2nd to the 5th. All the septa are straight and finely and sparsely granular, and all but those of the first cycle have the edge, within the calicular fossa, slightly sinuous.

Columella deep-seated, consisting of a fair number of twisted pinnacles arising from a basal network. Only the septa of the first two cycles meet the columella, and then only at a great depth in the calicular fossa.

Height of corallum	10 millim.
Major diameter of calicle	9 „
Minor „ „ „	8 „

III. Subgenus **Conotrochus** Seguenza.

Only differs from *Ceratotrochus* in having the theca immersed in an epitheca showing transverse growth-rings; the epitheca forms for the calicular orifice a well-marked boundary line in which the outer ends of the summits of the septa are somewhat sunk.

9. *Ceratotrochus (Conotrochus) funicolumna* n. sp. Plate I. Fig. 6, 6*a*.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 1 Ex., dead.
Stat. 100. 6° 11′ N. 120° 37′.5 E. 450 m. 2 Ex., dead.

The dead corallum, which is all that we possess of this singularly elegant species, looks much like a shortened form a of *Conotrochus typus* Seg. from the Sicilian Tertiaries, to which it is evidently nearly related, as also to *Pleurocyathus brunneus* Moseley.

Corallum attached, conical, short, the calicular orifice perfectly circular. The costæ, which correspond in number to the septa, are all of one size and form, but are somewhat hidden by a thin epitheca in which broad rings of accretion are noticeable.

The rounded summits of the septa are just visible above the sharply defined calicular margin. The septa are in six systems and four complete cycles, the primaries being the largest and the others gradually diminishing in size in serial succession; they all descend very deeply into the cup.

The columella is a stout isolated column of remarkable height, composed of over a dozen long ribbon-like strands, which are all tightly twisted together in one solid spiral like a piece of rope.

Height of corallum	12.5 millim.
Diameter of calicle	11.5 „

The rope-like columella of this species is very characteristic, and is well exhibited in all three specimens. No stereoplasma is present in any of them, a fact which is sufficient to separate the species from the closely allied *Pleurocyathus brunneus* of Moseley.

IV. Subgenus **Phloeocyathus** nom. nov.

Pleurocyathus Moseley (*nec* Keferstein), Challenger Deep Sea Madreporaria p. 159 (nom. præocc.).

The tips of the septa are embedded in stereoplasma: otherwise as *Conotrochus*.

10. *Ceratotrochus (Phlœocyathus) hospes*, n. sp. Plate II. fig. 8, 8*a*.

Stat. 150. 0°6′ N., 129°7′.2 E. 1089 m. 1 Ex. (broken).

Corallum conical, covered with a thin, dark-brown, speckled epitheca, beneath which numerous fine wrinkles and fine discrete granulation, as well as several bold growth-rings, are visible. No distinct costæ exist.

The calicular margin is circular and the epitheca is folded over it, so that the septa are sunk below it.

The calicular fossa is deep and, like the septa, is of a dark brown colour, the edges of the septa and the tips of the strands of the columella being nearly black. The septa do not project far into the fossa, and appear even less salient than they are owing to the presence of abundant stereoplasma. They are in six systems and four cycles, the last cycle being absent in a few of the half-systems. Those of the first cycle are slightly the largest.

Most of the septa touch the columella, which though very deep-seated is fairly prominent, and consists of about a dozen low cincinni.

The corallum of the unique specimen is broken, so that its height cannot be determined, but the maximum diameter of its nearly circular calicular orifice is close upon 9 millim.

A worm appears to have inhabited the corallum as a commensal, tunnelling in the stereoplasm.

From *P. brunneus* Moseley this species differs (1) in the absence of costæ, (2) in having the septa sunk below the margin of the calicle, and (3) in the larger columella.

V. **Lochmæotrochus**, n. gen.

This genus agrees in all respects with *Phlœocyathus* (= *Pleurocyathus* Moseley *nec* Keferstein, which Martin Duncan regards as identical with *Ceratotrochus* E. & H.) but differs in forming a bush-like colony by budding — sometimes dichotomously — near the calicular margin.

Corallum cylindro-conical, covered with a thickish epitheca which rises higher than the septa, budding near the calicular margin to form a small bushy colony.

Septa narrow, not much encroaching on the calicular fossa, slightly sunken below the calicular margin where they are immersed in a zone of stereoplasma.

Calicular fossa deep; septal loculi open to the base.

Columella of good size, loosely reticular or spongy, deep-seated.

No pali or paliform lobes of any sort.

11. *Lochmæotrochus oculeus* n. sp. Plate II. fig. 9, 9*a*.

Stat. 259. 5° 29′.2 S., 132° 52′.5 E. 487 m. 3 Ex.
Stat. 159. 0° 59′.1 S., 129° 48′.8 E. 411 m. Some dead and broken fragments.

The colony has the shape of a small irregular bush, formed by budding (often dichotomously) in several planes and up to the fourth generation. The budding takes place near the calicular margin, is fairly regular, and is a true gemmation.

An individual corallum when nearly fullgrown is cylindro-conical, sometimes straight, but usually a little curved. It is invested by a granular epitheca, which rises higher than the septa and forms a sharp rim or lip round the circular calicular orifice. The epitheca may entirely conceal the costæ, or may, at any rate in the lower half of the wall, leave faint traces of them.

The calicular fossa is deep, and its mouth is perfectly circular and level.

The septa, which are all of a height, are sunken and are separated from the overhanging epithecal lip by a well defined ring-groove. They do not project much into the calicle, and appear less salient than they really are because superiorly they are imbedded in a zone of stereoplasm. They are usually 36 in number, every alternate one reaching the columella. They are arranged in six systems and four cycles, the fourth cycle however being developed in only one half of each of the six systems, and the tertiary septa being enlarged in the six half-systems in which the fourth cycle exists. Thus the arrangement of the septa may be called regularly irregular. Ultimately, however, the septa reach the full number of 48, in six regular systems of four complete cycles.

The columella though deep-seated is large and prominent: it is fairly circular and consists of a loose spongy reticulum.

An average nearly full-grown corallum, with 36 septa, is 12 millim. long, the diameter of its mouth inside the prominent epithecal lip being 7 millim. Specimens with the full number of 48 septa are a little larger.

Though this species lies within Martin Duncan's division of *Turbinolidæ Gemmantes*, it is, as I have stated in the introduction, merely a compound *Ceratotrochus (Conotrochus)*, and at first I was inclined to regard it as identical with *Ceratotrochus (Phlœocyathus) hospes*, which species again is but little different from *Ceratotrochus (Conotrochus) funicolumna*.

From *Cœnocyathus* Edw. & H. *Lochmæotrochus* is readily distinguished by the absence of pali, and from *Gemmulatrochus* Duncan by the well-developed columella.

VI. **Cyathoceras** Moseley.

Cyathoceras Moseley. Challenger Deep-Sea Madreporaria, p. 156.

12. *Cyathoceras Tydemani* n. sp. Plate I. Fig. 7, 7*a*.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 2 Ex.
Stat. 105. 6° 8′ N., 121°19′ E. 275 m. 5 Ex.

Corallum elongate-goblet-shaped, attached by a short, curved, cylindrical pedicle. Thecal wall thin, granular. The costæ are granular ridges only reaching halfway down the thecal wall; those of the first two cycles are the most distinct, and even they are not very prominent.

Calicular orifice nearly horizontal; calicular fossa very deep.

The septa, which are only very slightly exsert, have a distantly-granular surface and a sinuous edge. They are 60 in number and their arrangement is decidedly irregular, appearing to be in six systems of four cycles with two extra half-systems intercalated. Those of the first two cycles are much the largest and the most exsert, while those of the other cycles diminish in size in serial succession.

Columella very deep-seated and very sharply delimited from the septa, consisting of two or more curling ribbons.

The appearance of this coral is exactly that of a *Caryophyllia* devoid of pali, or of a *Desmophyllum* with a Caryophylliaceous columella.

Height of corallum	17.5	millim.
Major diameter of calicle	8	„
Minor „ „ „	7	„

Cyathoceras Tydemani is closely related to *C. cornu* Moseley, which was dredged by the Challenger off the mouth of the Rio de la Plata, and off the South-East corner of Australia.

VII. **Trochocyathus** Edw. & H., Duncan.

There are two species of this genus in the collection.

Synopsis of the Siboga *Deep Sea species of* Trochocyathus.

I. Septa in more than four cycles: pali lamellar:
1. Septa and pali extremely regular: columella a reticulum of coarse granules. . . . . 1. *T. caryophylloides.*
2. Columella sublaminar: the septa of the fourth cycle usually unite with those of the third . . . . . 2. *T. pileus*

13. *Trochocyathus caryophylloides* n. sp. Plate II. Fig. 10, 10*a*.

Stat. 251. 5°28′.4 S., 132° 0′.2 E. 204 m. 1 Ex.
Stat. 253. 5°48′.2 S., 132°13′ E. 304 m. 1 Ex.
[Stat. 96. S. E. of Pearl Bank, Sulu Archipelago. 15 m. 4 Ex.]

Corallum fixed by a very short and rather slender peduncle with a non-encrusting base, a little curved and compressed, the major axis of the calicle on a slightly lower plane than the minor. Thecal wall finely granular; the costæ are little more than granular striæ becoming distinct ridges only near the calicular margin.

Septa stout, exsert, their surface beset with radiating rows of small granules; they are 64 in number and have an apparent arrangement in eight systems of four cycles. Those of the first two cycles are equally large and exsert; those of the third cycle are a little smaller and less exsert than their predecessors and a little larger and more exsert than their successors.

Pali stout but lamelliform, 32 in number and placed opposite all the septa except those of the last cycle; they are of two sizes — large ones opposite the 16 septa of the apparent third cycle, and small ones opposite the 16 septa of the apparent first two cycles — but they all stand in one ring of wonderful regularity, sharply defined both from the septa and from the columella.

Columella deep-seated, formed of a somewhat spongiform cushion of coarse granules.

Corallum whitish, soft parts brownish or reddish purple.

Height of corallum about 23 millim.
Major diameter of calicle 23 „

In appearence this coral is exactly like a *Caryophyllia*, the pali, though being present before all the septa except those of the last cycle, standing in a single ring. It has a striking resemblance to the *Paracyathus pulchellus* (Phil.) figured by Lacaze-Duthiers in Arch. de Zool. Expérim. (3) V. 1897, Pl. VII, only the pali are more regular than in the last species. As regards the pali, it has a close resemblance to *Paracyathus coronatus* Duncan (Proc. Zool. Soc., Lond., 1876, p. 432, pl. XXXVIII, Fig. 13).

14. *Trochocyathus pileus*, n. sp. Plate II. Fig. 11, 11*a*.

Stat. 95. 5°43′.5 N., 119°40′. E. 522 m. 4 Ex.

This species appears to be closely related to *T. mitratus* (Goldf.) from the Miocene of Southern Europe.

Corallum shaped either like a wedge or like a Phrygian cap, conical, a good deal compressed, with the base either acuminate and curved in the plane of the minor axis, or straight and truncated. In young specimens the corallum seems to be fixed.

Costæ equal, and equally salient from calicular lip to base, all very elegantly and evenly milled or serrated throughout their extent.

The calicular fossa is not very deep and is well filled by the septa and pali. The major axis of the calicular orifice is on a somewhat lower plane than the minor.

The septa, which are strongly echinulate, are in six systems of four cycles, with a fifth cycle developed in some of the half-systems. Those of the first two cycles, which are equal, are the largest and far the most exsert, and those of the lowest cycle are very much more

exsert than those which immediately precede them. Those of the fourth cycle usually unite with those of the third some distance above the columella.

The pali, which are lamellar and echinate, are about 30 in number and are placed opposite all the septa except those of the last cycle.

The columella, like that of *Tropidocyathus lessoni*, to which species *Trochocyathus pileus* is closely related, is very variable. In one specimen it consists of two rugose vertical plates placed end to end, in another specimen it consists of a single regular row of teeth, in another specimen it is a narrow spongiform mass, while in a fourth it consists of an elongate patch of pinnacles not distinctly delimited from the pali.

Greatest height of corallum of largest specimen	14 millim.
Major diameter of calicle	15 „
Minor „ „ „	10 „

In general appearance this species has a considerable likeness to *Tropidocyathus lessoni* without the wings. In the young stage this likeness is heightened by the presence of fairly prominent lateral costæ not unlike the wings of Tropidocyathus in an incipient state.

VIII. Subgenus **Thecocyathus** Edw. & H.

Differs from *Trochocyathus* in having the thecal wall surrounded, up to the calicular margin, with an epitheca.

The collection contains two species, of which one is represented by a dead and broken specimen and is referred to this subgenus with some doubt.

15. *Trochocyathus (Thecocyathus) rhombocolumna* n. sp. Plate II. Fig. 12.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 1 Ex. dead and broken.

The thecal wall is marked with fine transverse rugæ, somewhat as in *T. cincticulatus* mihi. The septa and pali are strongly echinulate.

Septa in six systems and four complete cycles; the primaries are large and coarse, as also are, but not to such a marked degree, the secondaries, both primaries and secondaries being much more exsert than the septa of the lower cycles. None of the septa unite with one another.

Pali lamellar, before all the septa except those of the last cycle; those opposite the tertiaries are much the largest.

Columella formed of four large rugose prisms arranged in a rhomb.

The unique specimen is dead and broken and is also the subject of a malformation on one side, so that a completer diagnosis is not possible.

16. *Trochocyathus (Thecocyathus) virgatus* n. sp. Plate II. Fig. 13.

Stat. 105. 6°8′ N., 121°19′ E. 275 m. 1 Ex.
[Stat. 96, South-East of Pearl Bank, Sulu Archipelago. 15 m. 1 Ex.]

This species has a very strong resemblance to *Paracyathus striatus* Phil. (*cf.* Duncan,

Trans. Zool. Soc. Lond. VIII, p. 319, Pl. XLIII. Figs. 9—13 and X, p. 240, Pl. XLIX. Figs. 4—10) from the Mediterranean, but is not at all compressed and has a copious epitheca.

Corallum attached, either cylindro-conical or very short, encrusted to within a very short distance of the calicular margin with a thick dead epitheca through which costæ here and there crop out. Above the well-defined limit of the dead epitheca is a vitreous epitheca, which may invade the lip of the calicle, but does not conceal the trenchant finely serrated costæ.

The septa, which are in six systems and four complete cycles, are very regular and are exsert, those of the first two cycles being more exsert than those of the third and fourth. Their edges though thin and trenchant are finely crenulate, and their surfaces are most elegantly ornamented with radiating crenulate striæ.

The pali, which are 24 in number, are thick, crenated, subprismatic pillars, placed in two crowns opposite the septa of the first three cycles, and particularly well delimited both from the septa and from the columella.

The columella, which is not deep-seated, consists of a large number (about 40) of small granular discrete pinnacles.

The septa of the first two cycles are purple-brown, those of the two inferior cycles are white tinged with purple-brown at the edge: the pali and the pinnacles of the columella are snow-white.

Height of corallum 20 millim.
Diameter of the circular calicle 11 „

The specimen from Station 96 though much shorter, and of denser and coarser consistence, is not otherwise distinguishable from the deepwater type.

IX. Subgenus **Tropidocyathus** Edw. & H.

Differs from *Trochocyathus* only in having the lateral costæ expanded to form a pair of wings. Even in some species of *Trochocyathus* the lateral costæ are dentate or even auriculate.

17. *Trochocyathus (Tropidocyathus) Lessoni* Mich. Plate II. Fig. 14, 14*a*.

Flabellum lessoni Michelin in Guerin's Magasin de Zoologie, 2me section, Mollusques et Zoophytes 1839—1844. Zoophytes pl. 6 (1840).
Tropidocyathus lessoni Milne Edwards et Haime, Annales des Sciences Naturelles, ser. 3, Zoologie, IX, 1848, p. 327, and Hist. Nat. des Coralliaires, II, p. 57.

Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390 m. 1 Ex., dead.
[Stat. 49a. 8° 23′.5 S., 119° 4′.6 E. 69 m. 3 Ex.]
[Stat. 260. 5° 36′.5 S., 132° 55′.2 E. 90 m. 2 Ex.]
[Stat. 289. 9° 0′.3 S., 126° 24′.5 E. 112 m. 1 Ex.]

I have no doubt that these all belong to Michelin's species, though the form of the auricles and of the columella is variable. A corresponding variation is noticeable in the series of *Trochocyathus pileus* just described. Only one specimen was dredged in deepwater and that was dead.

X. **Paracyathus** Edw. & H., Duncan.

It is almost impossible to identify the species of this genus without actual comparison of specimens. I have restricted the term to those species in which the pali are confused with the columella, otherwise I do not see how the line is to be drawn between this genus and *Trochocyathus*.

18. *Paracyathus Agassizi* Duncan.

Paracyathus agassizi Duncan. Transactions of the Zoological Society of London, VIII, 1874, p. 319, pl. XLIII. figs. 5—8.

Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397 m. 1 Ex.

I identify the single specimen with some doubt, having at first been inclined to regard it is a variety of *Trochocyathus (Thecocyathus) virgatus*.

Distribution. Atlantic, off the coast of Portugal, Arafura Sea.

19. *Paracyathus pruinosus*, n. sp. Plate III, fig. 17, 17*a*.

[Station 96. S. E. of Pearl Bank, Sulu Archipelago 15 m. 2 Ex.]

I include this species among the deep-sea fauna because, although it was dredged in only 15 metres of water, it was associated with such forms as *Deltocyathus magnificus*, *Trochocyathus caryophylloides* and *Thecocyathus virgatus*, and not with any shallow-water species. Its nearest relative is *Paracyathus striatus* Phil. (Duncan Trans. Zool. Soc. VIII p. 319 and X p. 240), an Atlantic species.

Corallum very dense and heavy, short or of moderate height, straight or curved, moderately compressed, and having an encrusting base.

Costæ evenly scabrous or finely granular-echinulate, distinct only near the calicular margin and soon becoming hidden by epitheca.

Calicle much filled by crowded septa and pali and by a large columella of crowded pinnacles: all these structures — septa, pali, and columella-pinnacles — have a sort of crystalline appearance, being covered with close wavy lines of confluent or semi-confluent granules.

The mouth of the calicle is elliptical, and the major axis is on a very slightly lower plane than the minor.

Septa thick, very close-set, in six systems of four cycles with a few of a fifth cycle in some of the half-systems. All are moderately exsert, those of the lowest cycle a little less so than those of the others.

Pali thick, up-standing, close-set, either prismatic or sublaminar, in two crowns, very sharply delimited from the septa, and in most places, but not everywhere, fairly well delimited from the columella. Those opposite to the first two cycles of septa are simple, but those opposite to the septa of the third cycle are very deeply cleft into two (sometimes into three) lobes.

Columella large, elliptical, slightly convex, not deep-set, consisting of a dense crowd of discrete pinnacles which are prismatic by mutual compression.

Corallum white: the soft parts, in spirit, are also whitish.

In the type specimen the greatest height of the corallum is 28 millim., the major diameter of the calicle 19.5 millim., and the minor diameter of the calicle 15 millim.

XI. **Deltocyathus** Edw. & H., Duncan.

Four species of this genus are represented in the collection, including a magnificent specimen of *D. magnificus*.

Synopsis of the Siboga *species of* Deltocyathus.

I. Septa in six systems and four complete cycles:
   1. Corallum discoid or saucer-shaped: conspicuous pali before the septa of the first three cycles. . . . . 1. *D. italicus.*
   2. Corallum onion-shaped, the pali before the secondary septa alone are distinct. . . . . 2. *D. lens.*

II. Septa in six systems and five complete cycles:
   1. Corallum discoid, dense septa echinulate. . . . . 3. *D. magnificus.*
   2. Corallum saucer-shaped, thin and fragile: septa non-echinulate. . . . 4. *D. fragilis.*

20. *Deltocyathus italicus* (Michelotti) Edw. & H.

Deltocyathus italicus Milne Edwards et Haime. Annales des Sciences Naturelles, 3 ser., Zool. IX, 1848, p. 326, pl. X. fig. 11, and Hist. Nat. des Coralliaires II, 56: Pourtalès, Bulletin of the Museum of Comp. Zool. Vol. VI, 1879—80, p. 101, pl. I, figs. 1– 8. Moseley, Challenger Deep-Sea Madreporaria, p. 145. Jourdan, Hirondelle Zoanthaires (Monaco, 1895) p. 16, pl. I. figs. 11*a*–*d*.

Deltocyathus agassizii Pourtalès, Bull. Mus. Comp. Zool. Vol. I, 1863—69, p. 113, and Vol. V, 1878—79, p. 200; and Illustrated Catalogue of the Museum of Comp. Zool. N° IV, 1871, p. 15, pl. II. figs. 1—5 and pl. V. figs. 9—10, and N° VIII, 1874, p. 35, pl. VI. fig. 11. Lindström, K. Svenska Vetenskaps-Akad. Handl. Bd. XIV, 1876, N° 6, p. 10, pl. I & II, fig. 13—20.

Stat. 45. 7° 24′ S., 118° 15′.2 E. 794 m. 1 Ex.
Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 1 Ex.
Stat. 100. 6° 11′. N., 120° 37′.5 E. 450 m. 2 Ex.
Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. 1 Ex.

I do not from the description and figures appreciate the distinction between this species and *D. ornatus* Gardiner. (On the Solitary Corals collected by Dr. A. Willey: Willey's Zoological Results part. II, p. 163).

Distribution. Atlantic (West Indies and neighbouring coast of America, Bermuda, Azores and E. Atlantic), East Indian Archipelago ("Challenger" and "Siboga"), South Pacific. Miocene of Northern Italy.

21. *Deltocyathus lens* n. sp. Plate II. Fig. 16, 16*a*.

Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390 m. 2 Ex.
Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 3 Ex., dead.
Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397 m. 1 Ex.
Stat. 275. 4° 52′.5 S., 128° 37′ E. 4914 m. 3 Ex.

Corallum onion-shaped or lentiform. Costæ all equal and all distinct from calicle to base, sharply salient and elegantly serrulate.

Septa elegantly echinulate, in six regular systems and four complete cycles: the primaries which are the largest and most exsert, reach the columella; the quaternaries unite with the tertiaries near the calicular margin, and the tertiaries with the secondaries near the columella.

At first sight the pali seem to be in a single crown situated opposite the secondary septa, but broad paliform lobes are also present opposite the tertiaries at the point where the quaternaries unite with them. The pali opposite the primaries are small denticles not distinguishable from the columella.

The columella consist of eight or ten denticles including those opposite the primary septa, which perhaps are pali.

Height of corallum 3 millim.
Diameter of disk 5 „

22. *Deltocyathus magnificus* Moseley.

Deltocyathus magnificus Moseley, Proceedings of the Royal Society, 1876, p. 662, and Challenger Deep Sea Madreporaria, p. 147, pl. IV. fig. 10, pl. XIII. figs. 1, 2.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 5 Ex.
[Stat. 96. S. E. Side of Pearl Bank, Sulu Archipelago 15 m. 7 Ex.]
Stat. 166? 2°28′.5 S., 131° 3′.3 E. 118 m. 1 Ex.

The specimen from Station 166? is a magnificent one, perfect, and over 28 millim. in diameter. Those from Station 95 are dead, broken, and discoloured. Also from Station 45 (7°24′ S., 118°15′.2 E., 794 m.) are some fragments that possibly belong to this species.

Distribution. East Indian Archipelago.

22*a* *Deltocyathus magnificus* var. *suluensis* nov.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 2 dead Ex.
Stat. 100. 6°11′ N., 120°37′.5 E. 450 m. 4 dead Ex.

These six specimens resemble the typical *Deltocyathus magnificus* in everything except that the septa of the fifth cycle, instead of uniting with one another over those of the fourth, are either free in all their extent or merely touch those of the fourth.

Corallum discoidal. The horizontal wall is costate, the costæ being all of one size and radiating from a central scar.

The septa are in six regular systems and five complete cycles, those of the last cycle being lower and very much thinner than those of the other four which, in the largest specimen, are of nearly equal size, so that the septa are alternately large and small. All the septa are about equally exsert at the edge of the disk.

The septa of the first cycle are independent throughout their course to the columella: those of the fourth cycle unite over and with those of the third, and those of the third unite over and with those of the second. At all these points of union there are paliform thickenings, and smaller paliform nodules are present at the ends of the primary septa. The septa are much worn but were evidently echinulate.

The columella is a spreading, encrusting, spongy mass.

The diameter of the largest specimen is about 14.5 millim.

Though at first sight the specimens which constitute this variety seem emphatically different from MOSELEY's *Deltocyathus magnificus*, yet a careful examination gives convincing evidence that the difference is quite superficial.

23. *Deltocyathus fragilis* n. sp. Plate II. Fig. 15, 15*a*.

Stat. 45. 7° 24′ S., 118° 15′.2 E. 794 m. 6 Ex.

Corallum saucer-shaped, of a thin vitreous texture, its margin rather raggedly scallopped by the slightly exsert septa and costæ.

The costæ are fine trenchant ridges; those of the first three cycles radiate from the centre to the circumference, but those of the lower cycles do not reach the centre.

The septa are in six regular systems and five complete cycles; they are extremely thin and are not in the least echinulate; those of the fourth cycle unite with each other over those of the third cycle some distance from the columella, and those of the fifth cycle curl in and unite with those of the fourth still further back. The union of the quinaries with the quaternaries is discontinuous, so as to give an appearance of synapticulæ.

Thin, irregular, and ragged pali are present before all the septa except those of the last cycle.

Columella of good size, of a delicate reticular and encrusting texture.

From all other species of *Deltocyathus* this is distinguished by its delicate, brittle, vitreous texture, and thin non-echinulate septa. In form and texture, and in the synapticula-like union of the quinary with the quaternary septa, it resembles *Trochocyathus rotulus* mihi.

The corallum of the largest specimen is 17 millim. in diameter.

XII. Citharocyathus, n. gen.

Corallum simple, cylindro-conical, free without any trace of early adhesion, naked. Costæ denticulate. Columella fasciculate, well developed.

There is a single crown of pali, and each palus is formed by the V-shaped union of processes from the septa of the third cycle in front of those of the second cycle.

This genus comes nearest to *Deltocyathus*, from which it differs (1) in the elongate cylindro-conical shape of the corallum, and (2) in the form of the pali, which are very conspicuous V-shaped structures forming a single very regular crown.

It also seems to be very closely related to *Nototrochus* Duncan (= *Notocyathus* Tenison-Woods) from which it differs (1) in its cylindro-conical form, (2) in the presence of a fasciculate columella, and (3) in the absence of any paliform lobes opposite the septa of the first cycle.

From *Conocyathus* d'Orbigny, which it also strongly resembles, it differs in having a well developed columella.

The two species which form the genus *Citharocyathus* have a striking resemblance to *Turbinolia*. They also resemble the *Conocyathus zelandiæ* described and figured by MARTIN DUNCAN in the Proceedings of the Zoological Society for 1876, p. 431, pl. XXXVIII fig. 1—3.

24. *Citharocyathus conicus* n. s. Plate III. fig. 18, 18*a*.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 2 Ex.

Corallum free, straight, moderately elongate, very elegantly cylindro-conical, ending in a point.

Costæ continuous from the pointed base to the circular mouth, broad and close-set but very deep-cut, crisply granular and denticulate, all of one size. Those corresponding with the primary septa are independent throughout their course, but those corresponding with the septa of lower orders are united in a series of figures like the Greek letter ψ, by successive bifurcations.

Calicular margin nearly circular. The calicle though deep is much filled up by the septa etc.

Septa elegantly and copiously denticulate, slightly exsert, arranged very regularly in six systems and four cycles. Those of the first cycle, which are somewhat the largest, are independent and may unite with the small columella. Those of the third cycle though not quite so high as those of the second cycle are larger than the latter (secondaries) and meet in front of them (secondaries) so as to exclude them from the columella. The point of union of the tertiary septa is very conspicuously marked by a large, high, V-shaped paliform lobe.

These six V-shaped pali, formed by the union of processes of the tertiary septa, but standing opposite the septa of the second order, are the only pali present. Like the septa they are echinulate.

The septa of the fourth cycle, though much smaller and somewhat less exsert than the others, descend deep into the calicle.

The columella consists of two or three contorted granular processes fused together: superficially it unites with the bases of the six upstanding pali, and much deeper down it may unite with the six primary septa.

Height of the corallum 8 millim. Diameter of the calicular orifice 6.5 to 7 millim.

25. *Citharocyathus venustus*, n. sp. Plate III, fig. 19, 19*a*.

Stat. 59. 10°22′.7 S. 123° 16′.5 E. 390 m. 4 Ex.

This species is essentially similar to *Citharocyathus conicus*, but differs from it in several particulars which are quite independent of age.

These particulars are as follows.

(1) The cylindro-conical corallum is slenderer and considerably more elongate.

(2) The septa of the first three cycles are strongly exsert, in striking contrast to those of *C. conicus*. (Those of the first cycle are the most exsert and those of the third cycle the least so).

(3) Though the septa are by no means smooth, they are much less conspicuously denticulate.

The height of the largest of the 4 specimens is 10.5 millim., and the diameter of its calicular orifice is 6 millim.

Some fragments from Station 159, 411 metres, which I was at first inclined to refer to the genus *Conocyathus*, probably belong to this or to the preceding species.

XIII. **Odontocyathus** Moseley.

Odontocyathus Moseley, Challenger Deep Sea Madreporaria p. 148.

There are three dead and broken specimens in the collection which are referable to this genus rather than to *Stephanotrochus*.

Synopsis of the Siboga *species of* Odontocyathus.

I. Corallum a bowl standing on legs formed by the six primary costæ:
  1. Septa strongly exsert, edge of bowl deeply scallopped . . . . . 1. *O. sexradiis*.
  2. Septa little exsert, edge of bowl not scalloped . . . . . 2. *Odontocyathus* sp.

II. Corallum perfectly flat, converted into a star by the six large horizontal septa and costæ of the first cycle. . . . . 3. *O. stella*.

26. *Odontocyathus sexradiis* n. sp. Plate III. Fig. 20, 20*a*—*b*.

Stat. 156. 0° 29′.2 S., 130° 5′.3 E. 469 m. 1 Ex.

The corallum is bowl-shaped, with the edges very deeply scallopped between the enormously exsert primary septa, and is supported on six long, strong, solid, smooth, radiating legs, which correspond in situation with the primary septa.

The costæ are but little more than ridges marked only on the sides of the bowl, not on the base where there is a smooth mammillar scar.

The septa are in six systems and five cycles, with a sixth cycle developed in some of the quarter-systems. Those of the first cycle are the largest and and far the most exsert, and they carry up with them those of the inferior cycles lying immediately on either side of them, which therefore are more exsert than all the other septa of the same and higher cycles below the first. The septa of the fourth cycle unite with those of the third some way before the latter reach the columella.

Pali are present, in three crowns, opposite the first three cycles of septa, and in those half-systems in which a sixth cycle of septa is partially developed there are also pali opposite the fourth cycle. The pali of the innermost crown are the smallest, and those of the outermost crown are the largest.

There is an abundant fasciculate or radiculate columella, with which the first three cycles of septa unite.

Major diameter of calicle	43	millim.
Minor „ „ „	34	„
Greatest height, to summit of the exsert primary septa	28	„
Least height, in interval between two primary septa .	18	„
Length of rootlets	over 20	„

This species is evidently very closely related to *Stephanotrochus Tatei* Dennant, from the South Australian Tertiaries (Trans. Roy. Soc. S. Australia XXIII. 1898—99, p. 117, Pl. III. Figs. 1*a*—*c*).

27. *Odontocyathus?* sp.

Stat. 262. 5° 53′.8 S., 132° 48′.8 E. 560 m. 1 Ex.

This is a small dead and damaged specimen, which may possibly be the young form of the previous species. It has six small roots, one of which has got out of place. The septa are little exsert, so that the edge of the bowl is not scallopped.

28. *Odontocyathus stella* n. sp. Plate III., fig. 21, 21*a*—*b*.

Stat. 159. 0° 59′.1 S. 129° 48′.8 E. 411 m. 1 Ex. dead and broken.

This species, like *Odontocyathus sexradiis*, has a very close resemblance to *Stephanotrochus tatei* Dennant. It is, however, even flatter than *S. tatei* and has fewer septa, while the combined septa and costæ of the first cycle besides being more prominent and exsert are horizontal.

Corallum flat, star-shaped owing to the remarkable extension outwards of the large and strong costæ and septa of the first cycle.

The basal wall is covered with fine discrete granules. There is a central scar of attachment, from which six strong costæ radiate horizontally like the spokes of a wheel. Costæ corresponding to the lower cycles of septa exist only near the edge of the hexagonal disk.

The septa are in six regular systems and four cycles, with traces of a fifth. Those of the first cycle are the highest and largest, and with the corresponding costæ form the great compressed spokes or rays which, projecting far beyond the edge of the disk, form the characteristic feature of this species. Those of the 2nd and 3rd cycles are about equal to one another and unite near the columella. Those of the 4th cycle are free, and do not reach the columella.

The edges of all the septa are ragged and their surface is echinulate; and as the margin of the hexagonal disk is somewhat concave between the great ray-like primary septa, the septa of the 2nd cycle are the least exsert of all but the quaternaries that lie immediately on either side of them.

Ragged paliform teeth are present in front of all the septa except those of the last (fourth) cycle.

The columella consists of a tortuous network of criply granular processes.

Maximum diameter of disk 12 millim.; span of corallum between the tips of opposite spokes 21 millim.

XIV. **Stephanotrochus** Moseley.

Stephanotrochus Moseley, Challenger Deep Sea Madreporaria, p. 151.

This genus is represented in the collection by 4 specimens, two of which are dead and broken coralla which can not be exactly determined, though they possibly belong to *S. weberianus*.

Synopsis of the Siboga *species of* Stephanotrochus.

I. There are 12 large and strongly exsert septa, and the septa of the inferior cycle immediately on either side of them are themselves remarkably exsert. 1. *S. weberianus.*

II. There are 21 large and much exsert septa, and the septa of the inferior cycle immediately on either side of them are not more exsert than the others. 2. *S. Sibogæ.*

29. *Stephanotrochus weberianus* n. sp. Plate III. Fig. 22, 22*a*.

Stat. 284. 8° 43′.1 S., 127° 16′.7 E. 828 m. 1 Ex.

Corallum bowl-shaped, with a strong bulge and thickening where the sidewall joins the base.

The base, which is covered with a dull epitheca, has a central wart-like scar from which costæ radiate, the costæ of the first two cycles being distinct but not prominent ridges while those of the lower cycles are fine striæ.

On the sidewall the costæ, which are all granular and of equal size, gradually become more and more distinct as they approach the calicular margin.

The calicular fossa is circular, deep, and capacious.

The septa appear to be regular, but are, in fact, very irregular owing to the occasional absence from some of the half-systems of those of the fifth cycle. The primaries and secondaries (twelve in number) are large and conspicuously exsert above all the others; they send up a small, granular, slightly-inflated, sinuous paliform process which is not really distinguishable from the columella. Those of the third cycle are smaller and much less exsert than their predecessors; they send off a large triangular paliform lobe long before they join the columella and in the systems in which five cycles are developed those of the fourth cycle resemble those of the third. Those of the fifth cycle (and of the fourth cycle in the few half-systems in which a fifth cycle is not developed) do not join the columella, but they descend deep into the calicle and become irregularly serrated near their termination. The septa of the inferior cycle which stand immediately on either side of the exsert primaries and secondaries are themselves strongly exsert. The septa have a "dead-polished" appearance, but under the lens they are finely striated in granular fashion.

The columella consists of a few granular and somewhat contorted knobs, mingled with the slightly inflated paliform processes in which the primary and secondary septa terminate.

Greatest height from basal scar to summit of the most exsert septa about 25 millim.

Diameter of calicle . . . . . „ 37 „

30. *Stephanotrochus Sibogæ* n. sp. Plate III. Fig. 23, 23*a*.

Stat. 88. 0° 34′6 N., 119° 8′.5 E. 1301 m. 1 Ex.

Corallum bowl-shaped, without any bulge where the sidewall meets the base.

The base, which is covered with a thick, dead, deeply-discoloured epitheca, has a central scar from which radiate sixteen great, thick, coarse costæ; in the furrows between these large costæ some faint discontinuous striæ are sometimes seen.

On the lower part of the sidewall costæ are indistinct, but in the upper two-thirds there are well-cut, granular, subequal costæ corresponding to all the cycles of septa.

The calicular fossa is circular, deep, and capacious.

The septa are in six systems and five cycles with a very irregular development of the fifth cycle. In the unique specimen there are 74 septa, of which 21 are larger and more

exsert than the others and divide the calice into 21 compartments; of these 21 compartments 16 contain three smaller septa each, and 5 contain only one smaller septum.

The 21 large exsert septa merge with the columella, but just before they do so they are notched, so that at their junction with the columella there is a sort of low paliform thickening — sinuous and very indistinctly paliform.

Of the 53 smaller septa, the middle one in each group of three gives off, very low down in the calicle, a bold paliform lobe, and then either runs on to the columella or joins one of the larger septa; while the remaining 37, which are narrow, end on the wall of the calicle.

The columella, which though low is very large and singularly compact, is made up almost entirely of the thickened granular contorted impacted ends of the 21 large septa, with but little assistance from the 16 septa of the next degree.

Greatest height of corallum to the summit of the most exsert septa about 25 millim.
Diameter of calicle . . . . . „ 37 „

Stephanotrochus sp.

Stat. 173. 3°27′ S., 131° 0′.5 E. 567 m. 1 Ex.
Stat. 284. 8°43′.1 S., 127°16′.7 E. 828 m. 1 Ex.

I do not number these specimens, as I believe them to be only dead and broken coralla of *S. weberianus*. Though they are shallower than the type specimen they have the same number (twelve) of large septa, and the same bulge or thickening where the sidewall joins the base of the corallum.

XV. Sabinotrochus Duncan.

Sabinotrochus Duncan, Transactions of the Zoological Society of London, VIII, 1874, p. 320 (1871), and Journal of the Linnean Society, Zoology, XVIII, 1885, p. 29.

Two small dead coralla, which I was at first inclined to refer to *Flabellum*, near *F. angulare* Moseley, seem to be, perhaps, referable to this genus.

31. ? *Sabinotrochus flatiliseptis* n. sp. Plate IV. Fig. 24, 24*a*.

Stat. 211. 5°40′.7 S., 120°45′.5 E. 1158 m. 1 Ex.

Corallum saucer-shaped, with a pedicled scar of attachment, whence radiate costæ, which, as well as the furrows between them, are covered with "oolitic" granules.

Septa in six systems and three cycles with some traces of a fourth. Those of the first two cycles are large and are remarkably inflated and granular in the middle of the shallow calicle, where they meet to form an umbilicated columella. Those of the third cycle sometimes join those of the second, but more often they end about midway between the centre and the circumference of the calicle.

Height of corallum about 5 millim.
Diameter of calicle 11 „

32. ? *Sabinotrochus bipatella* n. sp. Plate IV. Fig. 25, 25*a*.

Stat. 52. 9° 3′.4 S., 119° 56′.7 E. 959 m. 1 Ex.

Corallum discoidal, with a scar of attachment; granular costæ are present, but are distinct only in the peripheral half of the disk.

Septa in six systems and three cycles, with traces of a fourth. Those of the first cycle are the largest and stoutest. Those of the first two cycles unite to form a thin undermined disk-like columella, which half fills the shallow calicular fossa. Those of the third cycle do not unite with those of the second, though they tend to curve towards them; they do not usually reach the columella.

Height of corallum about 2 millim.
Diameter of disk „ 8 „

XVI. **Discotrochus** Edw. & H., Duncan.

The collection contains dead coralla of two species one of which is undoubtedly, the other doubtfully, referable to this genus.

33. *Discotrochus dentatus* n. sp. Plate IV. Fig. 26, 26*a*.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 4 Ex.
Stat. 98. 6° 9′ N., 120° 21′ E. 350 m. 3 Ex.
Stat. 100. 6° 11′ N., 120° 37′.5 E. 459 m. 1 Ex.

Nearly related to *D. investigatoris* mihi (Journ. Asiatic Soc. Bengal, LXII, pt. 2, 1893, p. 142, Pl. V, Fig. 5, 5*a*) from which it differs in having the septa less crowded though more numerous.

Corallum quite flat and discoidal, of thick coarse texture. On the horizontal base is a faint scar of attachment from which numerous equal well-cut costæ radiate.

Septa hardly exsert beyond the thick peripheral margin, in six systems and five cycles, the fifth cycle being incomplete in a few of the half-systems. The septa of the fifth cycle are thin, but those of all the other cycles are coarse and have their edges deeply and coarsely serrated throughout. Though the septa of the first cycle are distinctly the largest, those of the second and even of the third cycle are not very much smaller. There is no union of septa, except at the columella, where those of the first three cycles, and usually of the fourth cycle also, meet.

The columella, which is small and fascicular and consists of little but the united ends of the septa, is studded with a few coarse subprismatic granules.

The diameter of the disk of the largest specimen is 19 millim.

34. ? *Discotrochus* sp.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 2 Ex.

This is a little dead and eroded corallum, and cannot be accurately placed. It is solid,

thick, quite flat and disk-like, but has, radiating from its margin, six or eight short stout sharp spokes like those of *Odontocyathus*. There is a large reticulate and encrusting columella, and the septa, which are in four cycles of which the last is incomplete, appear to have been coarsely serrated. There are no signs of pali.

XVII. **Desmophyllum** Ehrenberg, E. & H., Duncan.

Three species are found in the Siboga collection, one of them being very young and therefore not specifically recognizable. Of the other two, one is the well known *D. crista-galli*, and the other is a new species characterized by the obscurity of the lower cycles of septa which are buried deep in the calicle.

35. *Desmophyllum crista-galli* Edw. & H.

Desmophyllum crista-galli Milne Edwards & Haime, Ann. Sci. Nat., Zool., (3), IX, 1848, p. 253, pl. VII, fig. 10; and Hist. Nat. Corall., II, p. 76: Saville Kent, Ann. Mag. Nat. Hist., (4), VI, 1870, p. 459 (= *D. Rusei* Duch. & Mich.): Martin Duncan, Trans. Zool. Soc., VIII, 1874, p. 321, pl. XLI, figs. 10—15 (= *D. cumingi* E. & H. and *D. costatum* E. & H.): Pourtalès, Bull. Mus. Comp. Zool., V, 1878—79, p. 203 (= *D. reflexum* Duch. & Mich. and *D. Rusei* Duch. & Mich.).

Stat. 259. 5° 29′.2 S., 132° 52′.5 E. 487. m. 2 Ex., dead.

Two dead specimens, one young, the other fullgrown, both with the exsert portions of the septa somewhat broken, are certainly this species.

Distribution. Atlantic, Mediterranean, Indo-Pacific, and Tertiary deposits of Italy.

36. *Desmophyllum* sp.

Stat. 95. 5° 43′.5 S., 119° 40′. E. 522. M. 1 Ex.

This is a very young specimen and cannot be identified with any certainty: it cannot be referred to the next species with which it was associated in life.

37. *Desmophyllum alabastrum* n. sp. Plate IV. Fig. 27, 27*a*.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 1 Ex.
Stat. 105. 6° 8′ N., 121° 19′ E. 275 m. 1 Ex.

Corallum elongate-goblet-shaped, nearly straight, little compressed, with a stout cylindrical peduncle and an encrusting base.

There are no costæ, but wavy transverse growth-lines are visible in places.

Septa thin, finely granular, in six regular systems and four cycles; but as the septa of the two inferior cycles are very fine and narrow and occur only in the depths of the calice and do not reach anywhere near the calicular margin, there appear to be, at first sight, only two cycles of septa. The septa of the second cycle are narrow, but they extend up to the calicular margin, though they are narrower there than they are in the depths of the fossa.

Those of the first cycle alone are large and conspicuous; they are a little exsert, a little unequal in size, and they descend straight to the very bottom of the cup, where they meet.

Corallum snow-white, the pedicle with a faint cinnamon-brown suffusion.

Greatest height of corallum	18	millim.
Major diameter of calicle	8	„
Minor „ „ „	7	„

The characteristic feature of the corallum of this species is the burial of the septa of the 3rd and 4th cycles in the depths of the cup where at first they escape notice. Its nearest relative seems to be *D. simplex* Verrill (American Journal of Science and Arts, 1870, p. 371) from the West Indies.

XVIII. **Flabellum** Lesson, E. & H., Duncan.

The identification of the species of this genus presents difficulties which, in the absence of actual types for comparison, are insuperable; for many of the species are not only highly variable, but they also undergo radical changes of form in the course of growth, these changes affecting the shape of the corallum, the form and size of the columella, and the number of the septa. No one can be more dissatisfied than I am myself with the present attempt to determine the large number of forms collected by the "Siboga".

Synopsis of the Siboga *Deep-sea species of* Flabellum.

Corallum free or becoming so: —

I. Corallum shaped like a fully-open fan: —

1. Septa in six or more cycles: —

I. The larger septa form 48 compartments each of which contains 3 smaller septa: the circumference of the corallum is less than a semicircle . . . . . 1. *F. distinctum.*

II. The larger septa form 48 compartments each of which contains 7 smaller septa: the circumference of the corallum is much more than a semicircle . . . . 2. *F. lamellulosum.*

2. Septa in 5 cycles, the last cycle incomplete: lip of calicle jagged . . . . . 3. *F. laciniatum* var.

II. Corallum shaped like a nearly-open fan: septa in 5 complete cycles: lip of calicle jagged . . . . . 4. *F. suluense.*

III. Corallum either a half-open fan, or a compressed cone: —

1. Septa in six or more cycles: —

I. Lateral costæ sharp or jagged . . . . . 5. *F. australe.*

II. No lateral costæ. . . . . 6. *F. latum.*

2. Septa in five cycles, the fifth cycle incomplete; lateral costæ sometimes spinose . . . . . 7. *F. irregulare.*

3. Septa in four cycles: no lateral costæ. . . . . 8. *F. dens.*

IV. Corallum an open oval cup: septa in five cycles, with the inferior cycles incomplete. . . . . 9. *F. japonicum.*

38. *Flabellum distinctum* Edw. & H.

Flabellum distinctum Milne Edwards et Haime, Ann. Sci. Nat., 3 ser., Zool., IX, 1848, p. 262, and Hist. Nat. Corall. II, 80. Duncan, Trans. Zool. Soc., London, VIII, 1874, p. 322, pl. XXXIX. figs. 1—13. Wyville Thomson, Depths of the Sea, pp. 431, 432. Jourdan, Hirondelle Zoanthaires (Monaco) 1895, p. 26, pl. II. figs. 12, 13.
Flabellum patens Moseley, Challenger Deep Sea Madreporaria, p. 172, pl. VI. figs. 4*a*, 5*a*.

Stat. 12. 7° 15′ S., 115° 15′.6 E. 289 m. 2 Ex.
[Stat. 51. Madura Bay & Molo-Strait. 69—91 m. 4 Ex.]
[Stat. 166. 2° 28′.5 S., 131° 3′.3 E. 118 m. 1 Ex.]

The two dead coralla from Station 12 are almost certainly this species, but I am not quite so confident about the other specimens.

Distribution. E. Atlantic (Azores and coast of Portugal), East Indian Archipelago and Japan; fossil in the Miocene of Southern Europe.

39. *Flabellum lamellulosum* n. sp. Plate IV. Fig. 28, 28*a*—*b*.

Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. 1 Ex.

Corallum snow-white, of excessively thin and translucent texture, shaped like a widely-stretched fan, its circumference being equal to about 285 degrees of a circle. There is a slender short pedicle, and the lateral costæ, which arch outwards and *downwards*, are sharp and finely and irregularly jagged. The two faces of the corallum are slightly concave and moderately everted, are traversed by faint radiating costæ, and are very faintly marked with fine wavy transverse accretion-lines.

The septa, which are very thin, are in the unique specimen 336 in number. Forty-eight large ones of equal size divide the calicle into 48 compartments each of which contains 7 smaller septa of diminishing size. Of these 7 septa the largest one (fifth cycle) does not descend quite to the level of the columella, the two next largest (sixth cycle) do not descend quite half-way down the calicular wall, and the four smallest (incomplete seventh cycle) are very short. The surfaces of the septa are finely, sharply, and somewhat sparsely granular, and their edges as they descend in the calicle become sinuous, especially in the case of the larger septa.

The columella, which is deep-seated and narrow, is formed by small trabeculæ from the 48 large septa of the first four cycles.

Greatest height of corallum 39 millim.
Maximum diameter of corallum 47 „

This species is, evidently, nearly related to *F. pavoninum*, but the corallum forms an arch of more than three quarters of a circle and the septa are nearly twice as numerous.

40. *Flabellum australe* Moseley.

Flabellum australe Moseley, Challenger Deep Sea Madreporaria, p. 173, pl. VII. figs. 4*a*, 5*a*, *b*.

Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. 1 Ex.

This species, which is otherwise not different from *F. distinctum*, is distinguished by the density and weight of the corallum and by the more than usual cutting away of the septa near the calicular margin. Under the thin film of living tissue which covers the outer surface of the thecal wall in the neighbourhood of the calicular margin a Polychæte is embedded, in the single "Siboga" specimen.

Distribution. Off South-east coast of Australia; Arafura Sea.

Flabellum sp.

Stat. 38. 7° 35′.4 S., 117° 28′.6 E. 521 m. 1 Ex.
Stat. 316. 7° 19′.4 S., 116° 49′.5 E. 538 m. 1 Ex.

These two specimens, although preserved with the living tissues, are not identifiable, owing to irregularity of growth due to uneven repair after damage. Their coralla have the density and weight of *F. australe.* In other respects they resemble *F. paripavoninum* mihi, from the depths off the Laccadives.

41. *Flabellum latum* Studer.

Flabellum latum Studer. Monatsber. d. Kngl. Preussischen Akad. der Wissenschaft. zu Berlin (1877) 1878, p. 630, Taf. I. Fig. 3*a—b*.

Stat. 105. 6° 8′ N., 121° 19′ E. 275 m. 1 Ex.

Distribution. South Pacific, off New Zeeland; Sulu Sea.

42. *Flabellum laciniatum*, Phil. var. *messum.*

Flabellum laciniatum var. Alcock. Investigator Deep Sea Madreporaria, p. 23.

Stat. 45. 7° 24′ S., 118° 15′.2 E. 794 m. 3 Ex.
Stat. 284. 8° 43′.1 S., 127° 16′.7 E. 828 m. 1 Ex.
Stat. 314. 7° 36′ S., 117° 30′.8 E. 694 m. 1 Ex.

This variety resembles a *F. laciniatum* in everything except that the ten large septa of the first two cycles that occupy the faces of the thecal wall are only moderately exsert, instead of forming deep-cut petaloid lobes. It thus looks like a *F. laciniatum* of which the petaloid lobes of the calicular margin have been chipped away. As in *F. alabastrum* Mosely the sides of the corallum are more or less pinched in near the middle.

43. *Flabellum suluense* n. sp. Plate IV. Fig. 29, 29*a—b*.

Stat. 100. 6° 11′ N., 120° 37′.5 E. 450 m. 1 Ex. dead.

Corallum compressed, shaped like a nearly full-spread fan, the margin of the calicle being a little less than a semicircle, the ends being concave, and the faces flat. Remains of a pedicle of attachment are present. The costæ are mere striæ: the margin of the calicle is rather finely jagged.

The septa are in six systems and five complete cycles; their surfaces have the usual rows of discrete granules. Those of the first three cycles are equal and alone form the columella; their vertical margins are very strongly sinuous. Those of the fourth cycle descend as low as the columella, but do not join it. Those of the fifth cycle do not descend halfway down the calicular wall.

Colour pale cinnamon, somewhat streaky.

Height of corallum 15 millim.; major diameter of month of calicle 23 millim., minor diameter 10 millim.

This species, though its texture is much coarser and denser, seems to have its nearest relative in *F. laciniatum* var. *messum*.

44. *Flabellum ? irregulare* Semper.

Flabellum irregulare Semper. Zeitschrift f. wiss. Zool. Bd. XXII, 1872, p. 242, pl. XVI. fig. 7—17.

Stat. 253. 5° 48′.2 S., 132° 13′ E. 304 m. 1 Ex.
[Stat. 49. 8° 23′.5 S., 119° 4′.6 E. 69 m. 2 Ex.]

45. *Flabellum dens* n. sp. Plate IV. Fig. 30, 30*a*.

Stat. 95. 5° 43′5 N. 119° 40′ E. 522 m. 9 Ex.

Corallum elongate, narrowly conical, strongly compressed, without costæ of any kind, but with very faint transverse growth-rings. The major axis of the calicular orifice, which is as 125 is to 50, is on a very slightly lower plane than the minor.

Calicular fossa very deep. Septa stout and strongly crimped; those of the first three cycles are equal, and unite to form the columella, those of the fourth cycle are about half the depth of those of the first three cycles, while those of the fifth cycle are present in only a few half-systems: consequently the usual arrangement of the septa is a large one alternating with a small one.

Height of corallum	16	millim.
Major diameter of calicle	12.5	„
Minor „ „ „	5	„

This species appears to be very nearly related to *F. transversale* Moseley (Challenger, Deep-Sea Madreporaria, p. 174, Pl. VI, Fig. 6). Another species to which it is closely related is *F. fastigatum* Dennant (Trans and Proc. Roy. Soc. S. Australia, XXIII. 1898—99, p. 113, Pl. II, Fig. 2*a*—*b*) from the Tertiaries of Victoria.

46. *Flabellum japonicum* Moseley.

Flabellum japonicum Moseley. Challenger Deep Sea Madreporaria, p. 168, pl. VII. fig. 3*a*, pl. XVI. fig. 12. Marenzeller. Zool. Jahrbücher, Syst. Abth. III, 1888, p. 45. — Alcock, Investigator Deep Sea Madreporaria, p. 23.

Stat. 17. 7° 28′.5 S., 115° 28′ E. 1060 m. 1 Ex.
Stat. 18. 7° 28′.2 S., 115° 24′.6 E. 1018 m. 7 Ex.
Stat. 212. 5° 54′.5 S., 120° 19′.2 E. 462 m. 1 Ex.

In none of these specimens are the costæ so prominent as they are in specimens from Indian Seas.

The specimen from Station 212 is singular in having the corallum elongate and compressed, with the lateral costæ sharp and almost cristiform, and the septa increased in number; it, however, has all the look *F. japonicum* from which I am not inclined to separate it.

Distribution. Off Japan, Java Sea, Bay of Bengal and Arabian Sea.

XIX. **Placotrochus** Edw. & H., Duncan.

47. *Placotrochus Candeanus* Edw. & H.

Placotrochus Candeanus Milne Edwards et Haime. Ann. Sci. Nat. Zool. 3 sér. IX, 1848, p. 283, and Hist. Nat. Corall. II, 99.

Stat. 12. 7° 15′ S., 115° 15′.6 E. 289 m. 1 Ex.

Distribution. China Sea, Java Sea.

XX. **Placotrochides** n. gen.

Two small dead and somewhat broken coralla of the "Siboga" collection might be referred to *Placotrochus* E. & H., but for the presence of a large fascicular columella almost as abundant as that of *Caryophyllia*. From *Platytrochus* E. & H. they are separated by the absence of the characteristic lateral costæ, and by a certain, apparently normal, irregularity of growth.

Corallum simple, compressed, free (or attached?), indistinctly costate. A pellicular epitheca may be present. Columella essential, elongate, and fascicular. Septa little exsert. No pali.

48. *Placotrochides dentiformis* n. sp. Plate IV. Fig. 31, 31*a*.

Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390 m. 1 Ex. dead.

Corallum free, simple, compressed, acutely wedge-shaped, fairly elongate, curved in the plane of the major axis apparently in consequence of increased growth at one end.

The costæ, which correspond in number with the septa, are almost worn away, but appear to have been low, broad, and equal — except that *one* of the lateral costæ seems to have been more prominent than any of the others.

The calicular orifice is ovate, not regularly elliptical; the axial diameters are as 3 : 2, and the major axis is on a slightly lower plane than the minor.

The septa, which are coarse, are in six systems and three cycles with a fourth cycle in a few of the half-systems. Those of the first two cycles are the largest and reach the columella,

their surface being coarsely granular and their vertical edge wavy. Those of the lower cycles do not reach the columella.

The columella, which consists of numerous coarse anastomosing curls, is elongate, prominent, and not very deep-seated.

Height of corallum 8 millim.; major diameter of mouth of calicle 6 millim., minor diameter 4 millim.

49. *Placotrochides scaphula* n. sp. Plate IV. Fig. 32, 32*a*.

Stat. 212. 5° 54′.5 S., 120° 19′.2 E. 462 m. 1 Ex., dead.

Corallum simple, compressed, extremely short, broad-based as if it had been broadly attached, shaped like a flat-bottomed boat.

The costæ are almost obscured by a thin ripple-marked epitheca on the side-wall, but are distinct enough on the base.

The calicular orifice is ovate, not regularly elliptical, one end being very much sharper than the other; its axial diameters are as 7 : 4, and the minor axis is on a slightly lower plane than the major.

The septa, which are thin, are arranged as if in eight systems of three cycles, and the majority of them reach the columella: their surface is sharply but very sparsely denticulate.

The columella is a large oval reticulum of thin, crisply-curled processes, and has a sunken look, owing to its septal junctions being higher than its centre.

Height of corallum between 2 and 3 millim.; major diameter of mouth of calicle 7 millim., minor diameter 4 millim.

II. Family Oculinidæ Duncan.

Two genera of this family are represented in the "Siboga" collection.

XXI. **Amphihelia** Edw. & H., Duncan.

Cf. Martin Duncan. Trans. Zool. Soc. London VIII, 1874, pp. 323—327 and Journ. Linn. Soc. Zool. XVIII, 1884—85, p. 39.

The collection includes representatives of four species of this genus.

Synopsis of the Siboga *species of* Amphihelia.

I. Mouths of calicles over 2 millim. in diameter:

1. Calicles shallow: costal striations short and indistinct. . . . . 1. *A. oculata.*
2. Calicles of moderate depth: no costæ, coenenchyma dense and very smooth. . . . . 2. *A. arbuscula.*
3. Calicles deepish: costal striations long, sinuous and distinct. . 3. *A. ramea.*

II. Mouths of calicles about 2 millim. in diameter: outer wall of calicles with fine longitudinal rows of fine granules. . . . . 4. *A. tenuis.*

50. *Amphihelia oculata* Linn., Edw. & H.

Amphihelia oculata Milne Edwards et Haime. Ann. Sci. Nat. Zool. 3 sér. XIII, 1850, p. 85, and Hist. Nat. Corall. II, 119 *(ubi synon.)*. Martin Duncan, Trans. Zool. Soc. Lond. VIII, p. 326, pl. XLV. figs. 1—3. Lacaze-Duthiers, Archiv. de Zool. Expérim. 3 sér. V, 1897, p. 142, pl. VIII. figs. 1—7.

Stat. 267. 5° 54′ S., 132° 56′.7 E. 984 m. A dead fragment.
Stat. 297. 10° 39′ S., 123° 40′ E. 520 m. A small branch.

In the Indian Museum there is a large piece of this species from the N. Atlantic ("*Caudan*" Expedition) some of the smaller branches of which agree in every respect with the Siboga fragment from Station 297. As to the identity of the small dead fragment from Station 267, I am not quite certain.

Distribution. N. Atlantic, Mediterranean, deep basins of East Indian Archipelago.

51. *Amphihelia ramea* Müller, Duncan.

Amphihelia ramea Martin Duncan. Trans. Zool. Soc. Lond. VIII, 1874, p. 326, pl. XLIV. figs. 1—3, pl. XLV. figs. 4—6, pl. XLVI. figs. 1—19.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. Two dead fragments.
Stat. 156. 0° 29′.2 S., 130° 5′.3 E. 469 m. Some dead fragments.
Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. Some fine branches.

According to Martin Duncan all *Diploheliæ* with costal striæ are referable to this species, which thus includes *Amphihelia miocænica* Seguenza, *Amphihelia atlantica* and *ornata* Duncan, *Diplohelia meneghiniana* and *döderleinia* and *sismondiana* Seguenza, and *Diplohelia profunda* Pourtalès. The last named, however, is a *Coenopsammia*.

The fine specimens which I identify with this variable species exhibit very close and regular budding and but slight tendency to anastomosis.

Distribution. Both sides of N. Atlantic, East Indian Archipelago; Sicilian Tertiaries.

52. *Amphihelia arbuscula* Moseley.

Lophohelia arbuscula Moseley. Challenger Deep Sea Madreporaria, p. 180, pl. VIII. figs. 9, 10.

Stat. 12. 7° 15′ S., 115° 15′.6 E. 289 m. Two small fragments.
Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. Numerous branches.
Stat. 156. 0° 29′.2 S., 130° 5′.3 E. 469 m. A small fragment.

This species differs from *A. oculata* chiefly in the greater density of the coenenchyma and the polish of its surface, and in the greater depth of the calicles. In some of the calicles there are small paliform lobes on the septa of the second cycle.

Distribution. East Indian Archipelago.

53. *Amphihelia tenuis* Moseley.

Lophohelia tenuis Moseley. Challenger Deep Sea Madreporaria, p. 180, pl. VIII. figs. 11—14.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. A small fragment.

There is no coenenchyma; the calicles are small long and trumpet-shaped, and their outer surface is longitudinally striped with rows of fine rounded granules.

Distribution. Off the Philippines.

XXII. **Sclerohelia** Edw. & H., Duncan.

54. *Sclerohelia formosa* Alcock.

? *Cyathohelia formosa* Alcock. Investigator Deep Sea Madreporaria, p. 26, pl. III. figs. 2, 2*a*.

Stat. 289. 9°0′.3 S., 126°24′.5 E. 112 m. Several pieces.

Distribution. Off the Maldives; off Celebes.

III. Family Astræidæ Edw. & H.

The collection contains but one species of this family.

XXIII. **Pourtalosmilia** Duncan.

Blastosmilia Duncan. Trans. Zool. Soc. Lond. X, 1877—79, p. 244 (1878).
Pourtalosmilia Duncan. Journ. Linn. Soc. Zool. XVIII. 1884—85. p. 72 (1884).

55. *Pourtalosmilia dumosa* n. sp. Plate V, fig. 33, 33*a*.

Stat. 156. 0°29′.2 S., 130° 5′.3 E. 469 m. Some dry branches.
Stat. 259. 5°29′.2 S., 132°52′.5 E. 487 m. A fragment.

The parent corallum is long, straight or slightly sinuous, cylindrical, and of the same diameter throughout: it gives off, on every side, buds which grow out into branches like but shorter than the parent, and these again give off a few short secondary branches: the primary and secondary branches may unite to form a bush with scalariform ramifications. The whole outer surface of the corallum is covered with fine discrete granules and is traversed by fine granular costal striations.

The calicular orifice is circular and the fossa extremely deep. The fossa is but little encroached upon by the non-exsert septa, which are in six systems and three cycles, those of the first cycle being much larger than those of the second which again are a little larger than those of the third. All the septa are thin, entire, and sometimes microscopically granular or spicular.

The septa of the first cycle unite at the bottom of the calicle, but there is no columella. The dissepiments are thin sheets of vitreous tissue placed very far apart.

The diameter of the calicle of the parent and of full-grown buds is about 3.5 millim.

I place this species in MARTIN DUNCAN's genus *Pourtalosmilia*, without however being able to appreciate the difference between this genus and the Triassic and Jurassic genus *Goniocora*. In external form this species much resembles the *Caryophyllia arbuscula* figured by Dana on plate 27 of his "Zoophytes."

MADREPORARIA FUNGIDA.

IV. Family LOPHOSERIDÆ Martin Duncan.

Only two genera of this family are represented in the collection.

XXIV. **Bathyactis** Moseley.

Bathyactis Moseley. Challenger Deep Sea Madreporaria, p. 185.

The collection contains four species, one of which is doubtfully referred to this genus, since it has a crown of large and very distinct pali opposite the septa of the second order.

Synopsis of the Siboga *species of* Bathyactis.

I. No pali distinguishable:
  1. Septa in four complete cycles. . . . . 1. *B. symmetrica.*
  2. Septa in five complete cycles:
    I. Basal wall flat, septa low. . . . . 2. *B. Sibogæ.*
    II. Basal wall very concave, septa very high. . . . . 3. *B. stephana.*
II. A crown of pali opposite the septa of the second order. . . . . 4. *B. palifera.*

56. *Bathyactis symmetrica* (Pourtalès) Moseley.

Fungia symmetrica Pourtalès. Illustr. Catalogue Mus. Comp. Zool, N° IV, 1871, p. 46, pl. VII, figs. 5, 6: Martin Duncan, Trans. Zool. Soc. VIII. 1873—74, p. 334, pl. XLIX, figs. 16—19.

Bathyactis symmetrica Moseley. Challenger Deep Sea Madreporaria, p. 186, pl. XI, figs. 1—13: Jourdan, Zoanthaires du yacht l'Hirondelle (Monaco, 1895, p. 28): Alcock Investigator Deep Sea Madreporaria, p. 28.

Stat. 12. 7° 15′ S., 115° 15′.6 E. 289 m. 1 Ex.
Stat. 18. 7° 28′.2 S., 115° 24′.6 E. 1018 m. 8 Ex.
Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390 m. 1 Ex.
Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 9 Ex.
Stat. 178. 2° 40′ S., 128° 37′.5 E. 835 m. 3 Ex.
Stat. 208. 5° 39′ S., 122° 12′ E. 1886 m. 1 Ex.
Stat. 241. 4° 24′.3 S., 129° 49′.3 E. 1570 m. 1 Ex.
"Label lost" . . . . . 28 Ex.

Distribution. All the Oceans, from 32 to 2900 fathoms.

57. *Bathyactis stephana* Alcock.

Bathyactis stephana Alcock. Journal Asiatic Soc. Bengal, Vol. LXII, pt. 2, 1893, p. 149, pl. V, figs. 12, 12*a*, and Investigator Deep Sea Madreporaria, p. 28, pl. III, fig. 5, 5*a*.

Stat. 88. 0° 34′.6 N., 119° 8′.5 E. 1301 m. 1 Ex.

3 small fragments from 49*a* may also possibly belong to this species: their texture is much stronger and denser, but this may be the result of shallow-water conditions.

Distribution. Bay of Bengal, Macassar Strait.

58. *Bathyactis Sibogæ* n. sp.

Stat. 95.? 5° 43′.5 N., 119 40′ E. 522 m. 1 Ex.
Stat. 159. 0° 59′.1 S., 129° 48′.8 E. 411 m. 1 Ex.
Stat. 175. 2° 37′.7 S., 130° 33′.4 E. 1914 m. 1 Ex.
Stat. 297. 10° 39′ S., 123° 40′ E. 520 m. 1 Ex.

It is unnecessary to give a lengthened description of this species, as it agrees with *B. symmetrica* in all respects except that (1) the septa are more numerous, being in 5 complete cycles instead of 4, and (2) the texture of the corallum is even more delicate. It is also much larger.

From *B. stephana*, which also has 5 cycles of septa, it differs in having the basal wall flat instead of deeply concave, and the septa low instead of very tall.

Diameter of largest specimen 57 millim.

59. *Bathyactis palifera* n. sp. Plate V. Fig. 34, 34*a*.

Stat. 98. 6° 9′ N., 120° 21′ E. 350 m. 2 Ex.
Stat. 153. 0° 3′.8 N., 130° 24′.3 E. 141 m. 3 Ex.

Corallum discoidal: basal wall nearly flat, with fine, low, but distinct, discretely-granular radiating costæ.

Septa in six systems and five complete cycles, those of the first cycle being free, but those of the other cycles combining to form six beautifully-regular deltas. In the first three cycles the septa rise up as high crest-like lobes, which are traversed by elegant parallel serrulate striæ: those of the first cycle are considerably the tallest, those of the third cycle considerably the lowest.

There are six large, foliaceous, upright, isolated pali — one opposite to each of the second cycle where these are joined by the septa of the third cycle.

The columella, which is small and umbilicate, is formed by the union of the 12 septa of the first two cycles.

The septa are echinulate, but besides this there are five or six concentric series of synapticulæ, which are most distinct in the neighbourhood of the 12 large septa of the first two cycles.

Diameter of corallum 17 millim.
Greatest height of corallum 6 „

Only dead coralla were dredged.

XXV. **Cycloseris** Edw. & H.

Stat. 100. 6° 11′ N., 120° 37′.5 E. 450 m. 1 Ex., dead and worn.

60. The single corallum dredged is dead and much ground down, so that its specific identity is lost.

MADREPORARIA PERFORATA.

V. Family Eupsammidæ Edw. & H , Duncan.

Five genera, including subgenera, are represented in the collection.

XXVI. **Stephanophyllia** Michelin, Edw. & H. Duncan.

Both of the Challenger species were dredged by the Siboga, along with a new and nearly-related species.

Synopsis of the Siboga *species of* Stephanophyllia.

I. The columella is a spongy mass: the primary septa are quite independent . 1. *S. formosissima.*
II. The columella is an elongate vertical lamella:
  1. The primary septa are in contact, near the middle, with the deltas on either side . . . . . 2. *S. complicata.*
  II. The primary septa are independent. . . . . 3. *S. fungulus.*

61. *Stephanophyllia formosissima* Moseley.

Stephanophyllia formosissima Moseley. Proc. Roy. Soc. 1876, p. 561, and Challenger Deep Sea Madreporaria, p. 201, pl. IV, fig. 11, pl. XIII, figs. 6, 7, pl. XVI, figs. 8, 9.

Stat. 95. 5° 43′.5 N., 119° 40′ E. 522 m. 2 Ex. (small and dead).
Stat. 95.? „ „ „ 2 Ex. (large, living).
Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397 m. 1 Ex. (small, dead).
Stat. 302. 10° 27′.9 S., 123° 28′.7 E. 216 m. 1 Ex.

The Siboga specimens were obtained in much the same place as those of the Challenger, namely off the Philippines and off the Kei Islands, with the additional locality further south denoted by Station 302.

61*a*. *Stephanophyllia formosissima* Moseley, var.

Stat. 45. 7° 24′ S., 118° 15′.2 E. 794 m. 1 Ex.
Stat. 284. 8° 43′.1 S., 127° 16′.7 E. 828 m. 1 Ex.

Though at first sight these two specimens seem to be something obviously distinct, a detailed comparison reveals nothing of specific value.

They differ from the typical form in the height and texture of the septa. The septa,

though much thinner and frailer, are singularly free from perforations and their edges, though wavy and jagged, are not dentate: those of the first two cycles are as high as, or even higher than, any of the others.

62. *Stephanophyllia complicata* Moseley.

Stephanophyllia complicata Moseley. Proc. Roy. Soc., 1876, p. 558, and Challenger Deep Sea Madreporaria, p. 198, pl. IV, fig. 2, pl. XIII, figs. 3—5.

Stat. 59. 10° 22′.7 S., 123° 16′.5 E. 390. m. 3 Ex., (dead).
Stat. 256. 5° 26′.6 S., 132° 32′.5 E. 397. m. 1 Ex., (dead).

These are small dead specimens: the one from Station 256 is certainly this species, but there is some doubt about the others which are considerably damaged. They were dredged in nearly the same place as the "Challenger" specimens.

63. *Stephanophyllia fungulus* n. sp. Plate V. Fig. 35, 35*a*—*b*.

Stat. 100. 6° 11′ N., 120° 37′.5 E. 450 m. 5 Ex., all dead.

As in *S. complicata* and certain other species, the columella (which is a stout upstanding lamina) stands in a star-shaped fossa, and each ray of the star is bisected by a primary septum.

Corallum of coarsish texture, circular, without trace of adherence, the under surface or wall flat or only very slightly convex, the upper surface very strongly and evenly convex.

Costæ of equal size, distinct from centre to edge of disk, bifurcating again and again until they become 96 in number. The perforations between the costæ form over 20 concentric rows.

Septa strongly convex, coarsish, with the edge more or less crenate, in six systems and five complete cycles. Those of the 1st cycle are independent, except that they are united with the immediately-adjacent quinaries by a few trabeculæ.

Perhaps the most conspicuous of all the septa are the two quinaries in each system which lie next to the primaries that bound the system: these quinaries curve inwards and finally unite with each other in front of the secondaries, a paliform nodule often marking the point of junction. The two outermost quinaries in each system form, in fact, a delta so connected with the septa of all the other cycles (except the independent primaries) that these appear to arise from the delta by a series of successive and very regular bifurcations.

The calicular space not included within the deltas has the form of a beautifully-regular six-rayed star, each ray of which is longitudinally bisected by a primary septum.

The columella is a stout vertical plate, the free edge of which may be entire or crenate.

The shallow calicular fossa, the sides of the columella, and the edges of the septa are sometimes studded with coarse granules.

The diameter of the largest specimen is 15 millim.

This species is closely related not only to *S. complicata* Moseley (from which it is distinguished by the characteristic predominance of the outermost quinaries of each system), but also to *S. implexa* Dennant, from which it differs emphatically in having a stout laminar columella.

XXVII. **Balanophyllia** Searles Wood, Edw. & H. Duncan.

Besides some dead and indeterminable fragments, three species of this genus are included in the collection.

Synopsis of the Siboga *Deep-sea species of* Balanophyllia.

I. Corallum fixed, elongate, fistulous, curved or sinuous, cylindrical, not increasing in diameter from base to calicle	*Balanophyllia* sp.
II. Corallum fixed, gradually expanding from base to calicle:	
I. Septa of the first two cycles equal, much larger than those of the fourth cycle	1. *B. cornu.*
II. Septa of the first cycle much the largest, very thick and spongy: the septa of the fourth cycle which adjoin the primaries are much larger than those of the second cycle, which they meet	2. *B. parvula.*

64. *Balanophyllia* sp.

Stat. 107. 6° 1′.5 N., 121° 28′ E. 270 m. 1 Ex.

I am unable to identify this species, and as it is dead and worn I do not care to name it. It is an elongate pipe-like form like *Balanophyllia (Thecopsammia) fistula*, from which it differs in having a large prominent compact columella made up of twisted lamellæ, much like that of *Balanophyllia (Thecopsammia) gemma* Moseley.

65. *Balanophyllia cornu* Moseley.

Balanophyllia cornu Moseley. Challenger Deep Sea Madraporaria, p. 192, pl. XII, figs. 11—15.

Stat. 297. 10° 39′ S., 123° 40′ E. 520 m. 1 Ex.

Though the beautiful specimen which I identify with this graceful species differs from the three individuals described by Moseley in having the septa more exsert, I believe it to be the same.

Jourdan ("Hirondelle" Zoanthaires) identifies this species from the N. Atlantic in the neighbourhood of the Azores. The "Challenger" specimens came from off the Kei Islands, and the "Siboga" specimens from the sea south of Timor.

66. *Balanophyllia parvula* Moseley.

Balanophyllia parvula Moseley. Challenger Deep Sea Madreporaria, p. 194, pl. XV, figs. 9, 9*a*.

Stat. 251. 5° 28′.4 S., 132° 0′.2 E. 204 m. 1 Ex.

The single specimen of this singularly beautiful species has all the well-marked specific characters described by Moseley, and only differs in being taller and more elegantly pedicellate.

Distribution. Celebes Sea, Banda Sea.

XXVIII. Subgenus **Thecopsammia** Pourtalès.

Thecopsammia Pourtalès. Illust. Cat. Mus. Comp. Zool., N⁰ IV, 1871, p. 43.

The collection contains two species referable to this genus.

Synopsis of the Siboga *Deep-Sea species of* Thecopsammia.

I. Corallum very elongate, fistulous or vermiform, of nearly equal diameter throughout its length: columella small and reticulate . . . . . 1. *T. fistula.*

II. Corallum expanding gradually from pedicle to calicle: Columella large and compact, made up of twisted lamellæ, ... 2. *T. gemma.*

67. *Balanophyllia (Thecopsammia) gemma* Moseley.

Thecopsammia gemma Moseley. Challenger Deep Sea Madreporaria, p. 195, pl. XV, figs. 8, 8*a*—*b*.

Stat. 297. 10° 39′ S., 123° 40′ E. 520 m. 1 Ex.

Distribution. Sulu-Celebes Sea, Sea south of Timor.

68. *Balanophyllia (Thecopsammia) fistula* n. sp. Plate V. Fig. 36, 36*a*.

Stat. 105. 6° 8′ N., 121° 19′ E. 275 m. 2 Ex.
Stat. 107. 6° 1′.5 N., 121° 28′ E. 270 m. 1 Ex.

Corallum greatly elongate, vermiform, subcylindrical and of nearly equal diameter throughout, covered with a thin epitheca beneath which it is granular and very indistinctly costate.

Calicular orifice broadly elliptical, with the lip thickened. Septa not exsert, in six systems and four complete cycles, thick and spongy at the junction with the calicular margin, thin and finely granular or spicular elsewhere. Those of the first cycle are much the largest; those of the second cycle are large, but do not quite reach the columella; those of the fourth cycle are a good deal larger than those of the third, towards which they curve and in front of which they meet.

Columella elliptical, prominent, loosely spongy, fairly deep-seated.

Length of broken corallum	95.00	millim.
Major diameter of calicle	7.00	„
Minor „ „ „	6.00	„

What look like secondary corallites, produced by budding, may be present on the dead part of the corallum, far from the calicle; but they are separate individuals which have simply settled there, as is shown by the fact that when they are detached the wall of the original corallum is found intact.

XXIX. Subgenus **Coenopsammia** Edw. & H.

Synopsis of the Siboga *Deep-sea species of* Coenopsammia.

The calicles are empty-looking, owing to the septa, which are subequal, being little more than ridges:

1. Corallites subcylindrical, the mouths of the calicles about four millim. in diameter:
   - I. Corallites on both sides of the branches, none in the axils . . . 1. *C. profunda.*
   - II. Corallites usually present in the axils of the branches and on only one side of the branch . . . . . 2. *C. amphelioides.*
2. Corallites funnel-shaped, the mouths of the calicles about 2 millim. in diameter: no coenenchyma . . . . . 3. *C. pusilla.*

69. *Dendrophyllia (Coenopsammia) profunda* Pourt.

Diplohelia profunda Pourtalès. Bull. Mus. Comp. Zool. Vol. I, 1863—69, p. 114.
Dendrophyllia profunda Pourtalès. Bull. Mus. Comp. Zool. Vol. V, 1878—79, p. 208, pl. I, figs. 6—8.

Stat. 266. 5° 56′.5 S., 132° 47′.7 E. 595 m. 2 Ex.

At first sight this species would be taken for an *Amphihelia (Diplohelia)*, as indeed it at first was by Pourtalès.

Distribution. Gulf of Mexico: Banda Sea: Sea off Ceylon.

70. *Dendrophyllia (Coenopsammia) amphelioides* n. sp. Plate V, fig. 37, 37*a*.

Stat. 156. 0° 29′.2 S., 130° 5′.3 E. 469 m. Some dead fragments.
Stat. 177. 2° 24′.5 S., 129° 38′.5 E. 1633 m. Some fine branches.

This species is very closely related to, if it is not identical with, *Coenopsammia scillæ* Seguenza (Mem. Accad. Sci. Torino 2 Ser. XXI, 1864, p. 519, tav. xiv. fig. 2). Like *Dendrophyllia profunda* Pourt., it at first sight strongly simulates an *Amphihelia*, for which in my preliminary sorting of the collection I mistook it.

Colony dendroid, gemmation taking place near the calicular margin and being alternately distichous or, more commonly, dichotomous leaving the parent calicle immersed and more or less compressed between two branches, as in *Cyathohelia*. The openings of the calicles all tend to face one way, and are commonly circular (except in the axils).

Costal striations all equally distinct, in the form of finely scabrous vermicular ridges traversing the whole length of the colony.

The calicles after budding are little prominent, or even almost immersed: they are deep and empty-looking owing to the shallowness of the septa.

Septa approximately equal, elegantly notching the somewhat tumid margin of the calicle but not exsert, not encroaching on the calicular fossa. They are in six regular systems and

three cycles: those of the third cycle usually unite with those of the second near the columella, but those of the first cycle usually remain independent.

Columella deep-seated, always present, but variable in size, spongy and crisp.

Diameter of calicles about 4 millim.

From *D. profunda* Pourt. this species is distinguished by the following characters:

(1) The corallites all face, or tend to face, one way, leaving one face of the dendroid colony quite bare:

(2) The budding is frequently dichotomous, with a corallite sunk in the axil between two branches, and after budding, the corallites project very little:

(3) The vermicular striæ of the corallites and coenenchyma, though bold enough, are not so coarse as in *D. profunda*:

(4) The mouths of the calicles are larger, owing to the lip being less swollen:

(5) The septa of the 3rd cycle are more nearly equal to those of the other two cycles, and they almost always unite with the secondaries:

(6) The tissue forming the columella is more abundant.

71. *Dendrophyllia (Coenopsammia) pusilla* n. sp. Plate V. Fig. 38, 38*a*.

Stat. 95. 5°43′.5 N., 119°40′ E. 522 m. 2 Ex.

This is another species that at first sight simulates an *Amphihelia*, having a strong resemblance to *A. tenuis* Moseley.

Colony made up of corallites which bud laterally near the calicular margin in an alternate-distichous (occasionally dichotomous) arrangement, without coenenchyma.

The surface of the corallum is frosted with sharp little granules, but there is no striation or vermiculation.

The corallites are elongate and funnel-shaped, with very deep empty-looking calicles, the mouths of which are a little oblique.

Septa subequal, in six systems and three cycles, those of the third cycle uniting with those of the second: they are not exsert and are very shallow, projecting but little into the calicular fossa.

There is no columella.

Length of a corallite	about 6 millim.
Diameter at base	„ 2 „
Diameter of calicular orifice	„ 2 „

IV. LIST OF THE LOCALITIES WHERE THE SIBOGA DEEP SEA MADREPORARIA WERE DREDGED.

STATION 12. 7° 15′ S., 115° 15′.6 E. East of Madura Strait, 289 M. *Caryophyllia clavus* var. *transversalis* Mos., *Flabellum distinctum* E. & H., *Placotrochus candeanus* E. & H., *Amphihelia arbuscula* Mos., *Bathyactis symmetrica* Pourt.

STATION 17. 7° 28′.5 S., 115° 28′ E. East of Madura Strait, 1060 M. *Flabellum japonicum* Mos.

STATION 18. 7° 28′.2 S., 115° 24′.6 E. East of Madura Strait, 1018 M. *Flabellum japonicum* Mos., *Bathyactis symmetrica* Pourt.

STATION 38. 7° 35′.4 S., 117° 28′.6 E. Off Paternoster Is., 521 M. *Flabellum australe*? Mos.

STATION 45. 7° 24′ S., 118° 15′.2 E. Off Paternoster Is., 794 M. *Caryophyllia scobinosa* n. sp., *Deltocyathus italicus* Mich., *Deltocyathus fragilis* n. sp., *Flabellum laciniatum* Phil. var. *messum* Alc., *Stephanophyllia formosissima* Mos. *var.*

STATION 52. 9° 3′.4 S., 119° 56′.7 E. Sandalwood Strait, 959 up to 36 M. *Sabinotrochus bipatella* n. sp.

STATION 59. 10° 22′.7 S., 123° 16′.5 E. S. of Timor, western entrance of Samau Strait, 390 M. *Caryophyllia ephyala* Alc., *Citharocyathus venustus* n. sp., *Flabellum* sp., *Placotrochides dentiformis* n. sp., *Tropidocyathus lessoni* Mich., *Deltocyathus lens* n. sp., *Bathyactis symmetrica* Pourt., *Stephanophyllia complicata* Mos., *Balanophyllia* sp.

STATION 88. 0° 34′.6 N., 119° 8′.5 E. Northern end of Macassar Strait, 1301 M. *Stephanotrochus Sibogæ* n. sp., *Bathyactis stephana* Alc.

STATION 90. 1° 17′.5 N., 118° 53′ E. Northern end of Macassar Strait, 281 M. *Coryophyllia quadragenaria* n. sp.

STATION 95. 5° 43′.5 N., 119° 40′ E. Southern end of Sulu Sea, 522 M. *Caryophyllia clavus* (?) Scacchi, *Caryophyllia ephyala* Alc., *Conotrochus funicolumna* n. sp., *Cyathoceras Tydemani* n. sp., *Trochocyathus pileus* n. sp. *Thecocyathus rhombocolumna* n. sp., *Citharocyathus conicus* n. sp., *Deltocyathus italicus* Mich., *Deltocyathus magnificus* Mos., *Deltocyathus magnificus* var. *suluensis* nov., *Deltocyathus lens* n. sp., *Discotrochus dentatus* n. sp., *Discotrochus* sp., *Flabellum dens* n. sp., *Desmophyllum alabastrum* n. sp., *Desmophyllum* sp.. *Amphihelia ramea* Müll., *Amphihelia arbuscula* Mos., *Amphihelia tenuis* Mos., *Bathyactis symmetrica* Pourt., *Bathyactis Sibogæ* n. sp., *Stephanophyllia formosissima* Mos., *Coenopsammia pusilla* n. sp.

STATION 96. South east side of Pearl Bank: Sulu Archipelago, 15 M. *Trochocyathus caryophylloides* n. sp., *Thecocyathus virgatus* n. sp., *Paracyathus pruinosus* n. sp., *Deltocyathus magnificus* Mos. [Although they were dredged in shallow water these are all deep-sea forms].

STATION 98. 6° 9′ N., 120° 21′ E. Southern end of Sulu Sea, 350 M. *Discotrochus dentatus* n. sp., *Bathyactis palifera* n. sp.

STATION 100. 6° 11′ N., 120° 37′.5 E. Southern end of Sulu Sea, 450 M. *Caryophyllia clavus* (?) Scacchi, *Conotrochus funicolumna* n. sp., *Deltocyathus italicus* Mich., *Deltocyathus magnificus* var. *suluensis* nov., *Discotrochus dentatus* n. sp., *Flabellum suluense*, n. sp., *Stephanophyllia fungulus* n. sp., *Cycloseris* sp.

STATION 101. 6° 15′ N., 120° 21′ E. Sulu Sea, 1270 M. *Caryophyllia cultrifera*, n. sp.

STATION 102. 6° 4′.1 N., 120° 44′ E. Southern end of Sulu Sea, 535 M. *Caryophyllia scobinosa* n. sp., *Ceratotrochus* sp.

STATION 105. 6° 8′ N., 121° 19′ E. South-eastern end of Sulu Sea, 275 M. *Cyathoceras Tydemani* n. sp., *Thecocyathus virgatus* n. sp., *Desmophyllum alabastrum* n. sp., *Flabellum latum* Studer, *Thecopsammia fistula* n. sp.

STATION 107. 6° 1′.5 N., 121° 28′ E. South-eastern end of Sulu Sea: Channel between the islands of Sulu and Bangalao, 270 M. *Balanophyllia* sp., *Thecopsammia fistula* n. sp.

STATION 150. 0° 6′ N., 129° 7′.2 E. 1089 M. *Phlœocyathus hospes* n. sp.

STATION 156. 0° 29′.2 S., 130° 5′.3 E. 469 M. *Odontocyathus sexradiis* n. sp., *Amphihelia ramea* Mull. *Amphihelia arbuscula* Mos., *Pourtalosmilia dumosa* n. sp., *Cœnopsammia amphelioides* n. sp.

STATION 159. 0° 59′.1 S., 129° 48′.8 E. 411 M. *Lochmœotrochus oculeus* n. sp., *Odontocyathus stella* n. sp., *Bathyactis sibogæ* n. sp., *Citharocyathus* (?) sp., *Ceratotrochus* (?) sp,, *Caryophyllia* (?) sp.

STATION 166. 2° 28′.5 S., 131° 3′.3 E. Between Misool and New-Guinea, 118 M. *Deltocyathus magnificus* Mos. (?) *Flabellum distinctum* E. & H. [Deep-Sea species though dredged in shallow water].

STATION 173. 3° 27′ S., 131° 0′.5 E. 567 M. *Stephanotrochus Weberianus?*

STATION 175. 2° 37′.7 S., 130° 33′,4 E. 1914 M. *Bathyactis Sibogæ* n. sp.

STATION 177. 2° 24′.5 S., 129° 38′.5 E. 1633 to 1300 M. *Caryophyllia panda* n. sp., *Coenopsammia amphelioides* n. sp., *Stephanophyllia formosissima* Mos.

STATION 178. 2° 40′ S., 128° 37′.5 E. North off Ceram, 835 M. *Bathyactis symmetrica* Pourt.

STATION 208. 5° 39′ S., 122° 12′ E. Flores Sea, 1886 M. *Bathyactis symmetrica* Pourt.

STATION 211. 5° 40′.7 S., 120° 45′.5 E. Flores Sea, 1158 M. *Sabinotrochus flatiliseptis* n. sp.

STATION 212. 5° 54′.5 S., 120° 19′.2 E. 462 M. *Flabellum japonicum* Mos., *Placotrochides scaphula* n. sp.

STATION 241. 4° 24′.3 S., 129° 49′.3 E. Banda Sea, 1570 M. *Bathyactis symmetrica* Pourt.

STATION 251. 5° 28′.4 S., 132° 0′.2 E. Banda Sea, 204 M. *Caryophyllia ephyala* Alc., *Caryophyllia quadragenaria*, n. sp., *Trochocyathus caryophyllioides* n. sp., *Deltocyathus italicus* Mich., *Flabellum lamellulosum* n. sp., *Flabellum australe* Mos., *Amphihelia ramea* Müll., *Balanophyllia parvula* Mos.

STATION 253. 5° 48′.2 S., 132° 13′ E. 304 M. *Trochocyathus caryophylloides* n. sp., *Flabellum irregulare?* Semper.

STATION 256. 5° 26′.6 S., 132° 32′.5 E. 397 M. *Caryophyllia clavus* var. *transversalis* Mos., *Ceratotrochus venustus* n. sp., *Paracyathus Agassizii* Duncan, *Deltocyathus lens* n. sp., *Stephanophyllia formosissima* Mos., *Stephanophyllia complicata* Mos.

STATION 259. 5° 29′.2 S., 132° 52′.5 E. 487 M. *Sclerohelia formosa* Alc., *Desmophyllum crista-galli* E. & H., *Lochmœotrochus oculeus* n. sp., *Pourtalosmilia dumosa* n. sp., *Caryophyllia* sp., *Amphihelia* sp.

STATION 262. 5° 53′.8 S., 132° 48′.8 E. 560 M. *Odontocyathus?* sp.

STATION 266. 5° 56′.5 S., 132° 47′.7 E. 595 M. *Coenopsammia profunda* Pourt.

STATION 267. 5° 54′ S., 132° 56′.7 E. 984 M. *Amphihelia oculata* L.

STATION 275. 4° 52′.5 S., 128° 37′ E. Banda Sea, 4914 M. *Deltocyathus lens* n. sp.

STATION 284. 8° 43′.1 S., 127° 16′.7 E. Arafura Sea. 828 M. *Stephanotrochus Weberianus*? *Flabellum laciniatum* Phil. var. *messum*, *Stephanophyllia formosissima* Mos. var.

STATION 297. 10° 39′ S., 123° 40′ E. Off the Sahul Bank, South of Timor, 520 M. *Amphihelia oculata* L., *Bathyactis Sibogæ* n. sp., *Balanophyllia cornu* Mos., *Thecopsammia gemma* Mos.

STATION 302. 10° 27′.9 S., 123° 28′.7 E. 216 M. *Stephanophyllia formosissima* Mos.

STATION 314. 7° 36′ S., 117° 30′.8 E., 694 M. *Flabellum laciniatum* Phil., var. *messum*.

STATION 316. 7° 19′.4 S., 116° 49′.5 E. Neighbourhood of Paternoster Is. 538 M. *Flabellum australe*? Mos

V. LIST OF THE SPECIES OF DEEP-SEA MADREPORARIA OF THE SIBOGA COLLECTION.

MADREPORARIA APOROSA.

I. Family Turbinolidæ.

	Station.	Page.	Plate.	Figure.
I. Caryophyllia.				
1. C. cultrifera n. sp.	101	7	I.	1, 1*a*.
2. C. scobinosa n. sp.	45 & 102	8	I.	2, 2*a*.
3. C. panda n. sp.	177	9	I.	3, 3*a*.
4. C. ephyala Alc.	59, 95 & 251	9	—	—
5. C.? clavus Scacchi.	95, 100 & 259	9	—	—
6. C. transversalis Mos.	12 & 256	9	—	—
7. C. quadragenaria n. sp.	90, 251 (& 289)	10	I.	4, 4*a*.
8. Caryophyllia? sp.	159	7	—	—
II. Ceratotrochus.				
1. C. venustus n. sp.	256	10	I.	5, 5*a*.
2. Ceratotrochus sp.	102	10	—	—
3. Ceratotrochus sp.	159	10	—	—
III. Conotrochus.				
1. C. funicolumna n. sp.	95 & 100	11	I.	6, 6*a*.
IV. Phlœocyathus.				
1. P. hospes n. sp.	150	12	II.	8, 8*a*.
V. Lochmæotrochus.				
1. L. oculeus n. sp.	159 & 259	13	II.	9, 9*a*.
VI. Cyathoceras.				
1. C. Tydemani n. sp.	95 & 105	14	I.	7, 7*a*.

	Station.	Page.	Plate.	Figure.
VII. Trochocyathus.				
1. T. caryophylloides n. sp.	251. 253 (& 96)	14	II.	10, 10*a*.
2. T. pileus n. sp.	95	15	II.	11, 11*a*.
VIII. Thecocyathus.				
1. T. rhombocolumna n. sp.	95	16	II.	12.
2. T. virgatus n. sp.	105 (& 96)	16	II.	13.
IX. Tropidocyathus.				
1. T. Lessoni Mich.	59 (49*a*, 260, 289).	17	II.	14, 14*a*.
X. Paracyathus.				
1. P. Agassizi Duncan.	256	18	—	—
2. P. pruinosus n. sp.	(96)	18	III.	17, 17*a*.
XI. Deltocyathus.				
1. D. italicus Mich.	45, 95, 100 & 251	19	—	—
2. D. lens n. sp.	59, 95, 256 & 275	19	II.	16, 16*a*.
3. D. magnificus Mos.	95, 166? (& 96)	20	—	—
„ „ var. suluensis	95 & 100	20	—	—
4. D. fragilis n. sp.	45	21	II.	15, 15*a*.
XII. Citharocyathus.				
1. C. conicus n. sp.	95	22	III.	18, 18*a*.
2. C. venustus n. sp.	59	22	III.	19, 19*a*.
XIII. Odontocyathus.				
1. O. sexradiis n. sp.	156	23	III.	20, 20*a*, *b*.
2. Odontocyathus sp.	262	24	—	—
3. O. stella n. sp.	159	24	III.	21, 21*a*, *b*.
XIV. Stephanotrochus.				
1. S. weberianus n. sp.	284 (and 173?)	25	III.	22, 22*a*.
2. S. Sibogæ n. sp.	88	25	III.	23, 23*a*.
XV. Sabinotrochus.				
1. S. flatiliseptis n. sp.	211	26	IV.	24, 24*a*.
2. S. bipatella n. sp.	52	27	IV.	25, 25*a*.
XVI. Discotrochus.				
1. D. dentatus n. sp.	95, 98 & 100	27	IV.	26, 26*a*.
2. Discotrochus sp.	95	27	—	

	Station.	Page.	Plate.	Figure.
XVII. Desmophyllum.				
1. D. crista-galli E. & H.	259	28	—	—
2. D. alabastrum n. sp.	95 & 105	28	IV.	27, 27*a*.
3. Desmophyllum sp.	95	28	—	—
XVIII. Flabellum.				
1. F. distinctum E. & H.	12 (51 & 166)	30	—	—
2. F. lamellulosum n. sp.	251	30	IV.	28, 28*a*, *b*.
3. F. australe, Mos.	251	30	—	—
Flabellum sp. (? australe Mos.).	38, 216	31	—	—
4. F. latum Studer.	105	31	—	—
5. F. laciniatum Phil. var. messum.	45, 284 & 314	31	—	—
6. F. suluense n. sp.	100	31	IV.	29, 29*a*, *b*.
7. F. irregulare Semper.	253 (49*a*)	32	—	—
8. F. dens n. sp.	95	32	IV.	30, 30*a*.
9. F. japonicum Mos.	17, 18 & 212	32	—	—
XIX. Placotrochus.				
1. P. candeanus E. & H.	12	33	—	—
XX. Placotrochides.				
1. P. dentiformis n. sp.	59	33	IV.	31, 31*a*.
2. P. scaphula n. sp.	212	34	IV.	32, 32*a*.
II. Family Oculinidæ.				
I. Amphihelia.				
1. A. oculata L.	267 & 297	35	—	—
2. A. ramea Müll.	95, 156 & 251	35	—	—
3. A. arbuscula Mos.	12, 95, 156	35	—	—
4. A. tenuis Mos.	95	36	—	—
II. Sclerohelia.				
1. S. formosa Alc.	259	36	—	—
III. Family Astreidæ.				
I. Pourtalosmilia.				
1. P. dumosa n. sp.	156, 259	36	V.	33, 33*a*.

MADREPORARIA FUNGIDA.

I. Family Lophoseridæ.

	Station.	Page.	Plate.	Figure.
I. Bathyactis.				
1. B. symmetrica Pourt.	12, 18, 59, 95, 178, 208, 241.	37	—	—
2. B. stephana Alc.	88 (49*a*?)	38	—	—
3. B. Sibogæ n. sp.	95? 159, 175, 297	38	—	—
4. B. palifera n. sp.	98, 153	38	V.	34, 34*a*.
II. Cycloseris.				
1. Cycloseris sp.	100	39	—	—

MADREPORARIA PERFORATA.

I. Family Eupsammidæ

	Station.	Page.	Plate.	Figure.
I. Stephanophyllia.				
1. S. formosissima Mos.	95, 177, 256 & 302	39	—	—
S. formosissima Mos. var.	45 & 284	39	—	—
2. S. complicata Mos.	59 & 256	40	—	—
3. S. fungulus n. sp.	100	40	V.	35, 35*a*, *b*.
II. Balanophyllia.				
1. B. cornu Mos.	297	41	—	—
2. B. parvula Mos.	251	41	—	—
3. Balanophyllia sp.	107	41	—	—
4. Balanophyllia sp.	59	41	—	—
III. Thecopsammia.				
1. T. gemma Mos.	297	42	—	—
3. T. fistula n. sp.	105 & 107	42	V.	36, 36*a*.
IV. Coenopsammia.				
1. C. profunda Pourt.	266	43	—	—
2. C. amphelioides n. sp.	156 & 177	43	V.	37, 37*a*.
3. C. pusilla n. sp.	95	44	V.	38, 38*a*.

CONTENTS.

Page

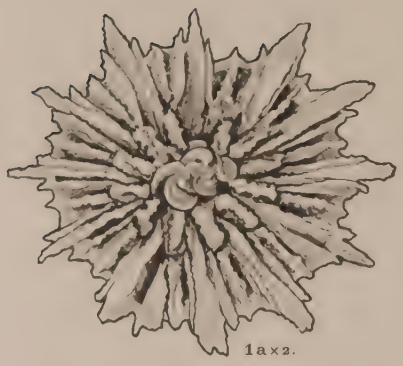
I. Introduction 1
II. List of Authors consulted 4
III. Systematic Account of the Siboga Deep-Sea Madreporaria. 7
IV. List of the Localities where the Siboga Deep-Sea Madreporaria were dredged. 45
V. List of the Species of Deep-Sea Madreporaria of the Siboga Collection 48
VI. Plates 53

EXPLANATION OF PLATES.

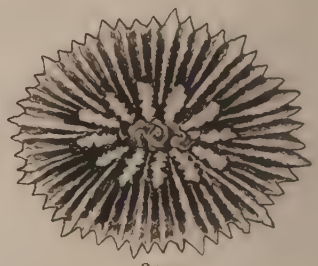
1×2.

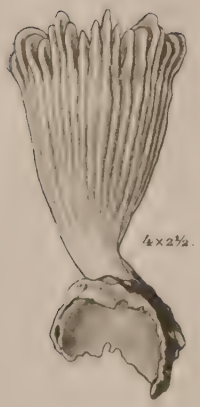
2×2.

3×2.


1a×2.

2a×2.


3a×2.


4×2½.

5×4.

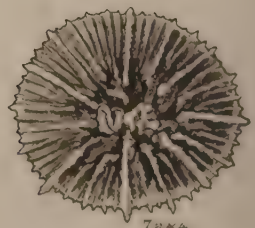
6×2.

7×3.

4a×3

5a×4

6a×2.


7a×4

1. Caryophyllia cultrifera, A.A.
2. Caryophyllia scobinosa, A.A.
3. Caryophyllia panda, A.A.
4. Caryophyllia quadragenaria, A.A.
5. Ceratotrochus venustus, A.A.
6. Ceratotrochus (Conotrochus) funicolumna, A.A.
7. Cyathoceras tydemani, A.A.

PLATE I.

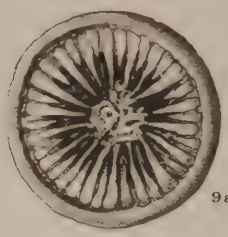
Fig. 1, 1*a*. Caryophyllia cultrifera. × 2.
Fig. 2, 2*a*. Caryophyllia scobinosa. × 2.
Fig. 3, 3*a*. Caryophyllia panda. × 2.
Fig. 4. Caryophyllia quadragenaria. × $2^1/_2$.
Fig. 4*a*. Caryophyllia quadragenaria. × 3.
Fig. 5, 5*a*. Ceratotrochus venustus. × 4.
Fig. 6, 6*a*. Ceratotrochus (Conotrochus) funicolumna. × 2.
Fig. 7. Cyathoceras Tydemani. × 3.
Fig. 7*a*. Cyathoceras Tydemani. × 4.

8×3.

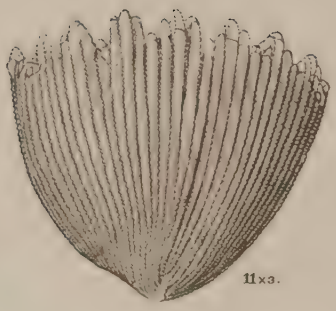
9.

10×2.

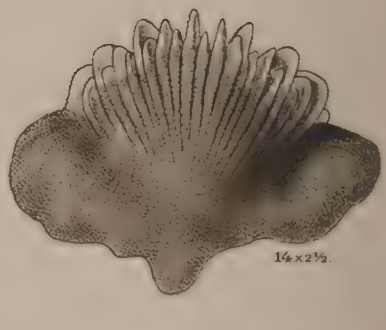
8a×4.


9a×4.

10a×2.


11×3.

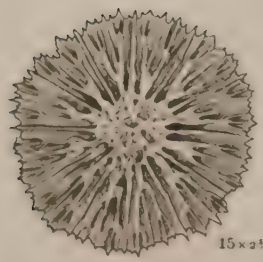
12×4.

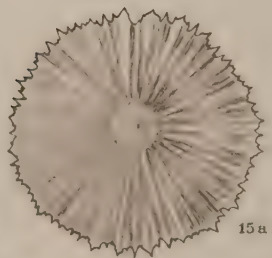

14×2½.

11a×3.

13×4

14a×2½.


15×2½.


15a×2½.

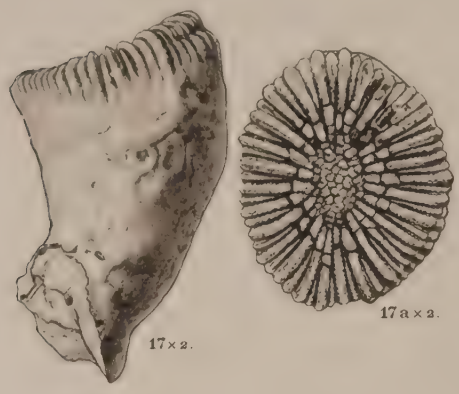
16×8.

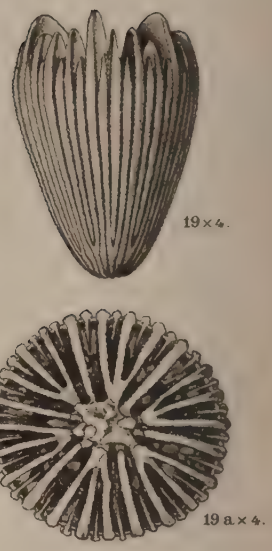
16a×8

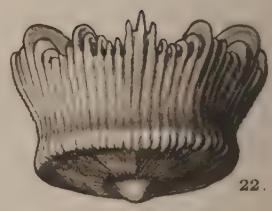
8. Ceratotrochus (Phloeocyathus) hospes, A.A.
9. Lochmaeotrochus oculeus, A.A. „
10. Trochocyathus caryophyllioides, A.A.
11. Trochocyathus pileus, A.A.
12. Thecocyathus rhombocolumna, A.A.
13. Thecocyathus virgatus, A.A.
14. Tropidocyathus Lessoni Mich.
15. Deltocyathus fragilis, A.A.
16. Deltocyathus lens, A.A.

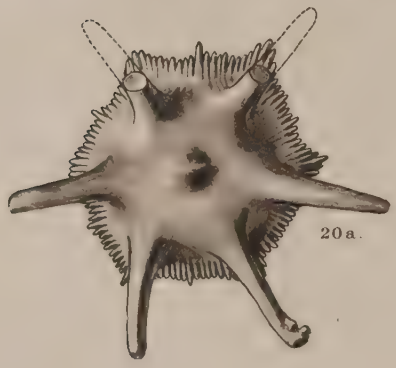
PLATE II.

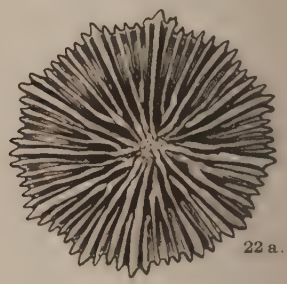
Fig. 8. Ceratotrochus (Phlœocyathus) hospes. × 3.
Fig. 8*a*. Ceratotrochus (Phlœocyathus) hospes. × 4.
Fig. 9. Lochmæotrochus oculeus: *natural size.*
Fig. 9*a*. Lochmæotrochus oculeus. × 4.
Fig. 10, 10*a*. Trochocyathus caryophyllioides. × 2.
Fig. 11, 11*a*. Trochocyathus pileus. × 3.
Fig. 12. Trochocyathus (Thecocyathus) rhombocolumna. × 4.
Fig. 13. Trochocyathus (Thecocyathus) virgatus. × 4.
Fig. 14, 14*a*. Trochocyathus (Tropidocyathus) Lessoni. × $2^1/_2$.
Fig. 15, 15*a*. Deltocyathus fragilis. × $2^1/_2$.
Fig. 16, 16*a*. Deltocyathus lens. × 6.

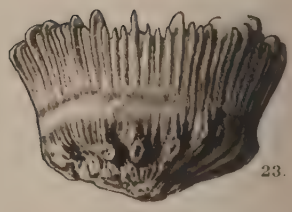


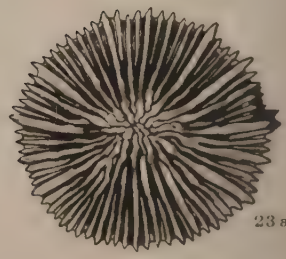












17. Paracyathus pruinosus, A.A.
18. Citharocyathus conicus, A.A.
19. Citharocyathus venustus, A.A.
20. Odontocyathus sexradiis, A.A.
21. Odontocyathus stella, A.A.
22. Stephanotrochus weberianus, A.A.
23. Stephanotrochus Sibogae, A.A.

Mondul del

PLATE III.

Fig. 17, 17*a*. Paracyathus pruinosus. × 2.
Fig. 18, 18*a*. Citharocyathus conicus. × 4.
Fig. 19, 19*a*. Citharocyathus venustus. × 4.
Fig. 20, 20*a*, 20*b*. Odontocyathus sexradiis: *natural size.*
Fig. 21, 21*a*, 21*b*. Odontocyathus stella. × 2.
Fig. 22, 22*a*. Stephanotrochus weberianus: *natural size.*
Fig. 23, 23*a*. Stephanotrochus Sibogæ: *natural size.*

26×2½.

26a×2½.

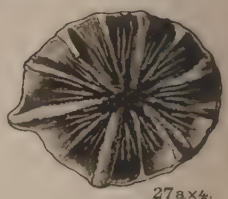
25×3.

25a×3.

24×2.

24a×2.

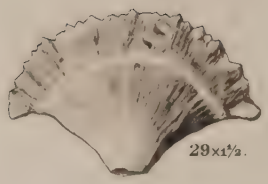
27×2.


27a×4.

28b.

30×2½.

30a×2½.


29×1½.

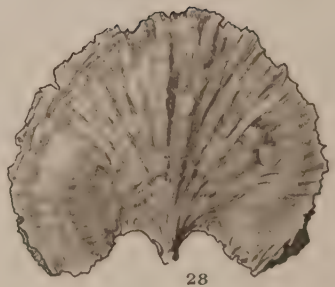
29a×1½.

28a.

31×4.

31a×4

29b×1½.


28

32×5.

32a×5.

24. Sabinotrochus flatiliseptis, A.A.

25. Sabinotrochus bipatella, A.A.

26. Discotrochus dentatus, A.A.

27. Desmophyllum alabastrum, A.A.

28. Flabellum lamellulosum, A.A.

29. Flabellum sulnense, A.A.

30. Flabellum dens, A.A.

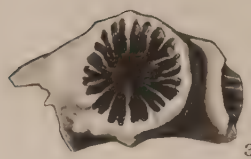
31. Placotrochides dentiformis, A.A.

32. Placotrochides scaphula, A.A.

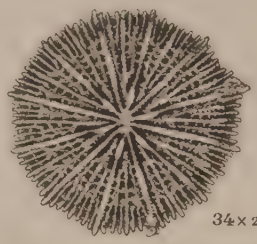
PLATE IV.

Fig. 24, 24*a*. Sabinotrochus flatiliseptis. × 2.
Fig. 25, 25*a*. Sabinotrochus bipatella. × 3.
Fig. 26, 26*a*. Discotrochus dentatus. × $2^1/_2$.
Fig. 27. Desmophyllum alabastrum. × 2.
Fig. 27*a*. Desmophyllum alabastrum. × 4.
Fig. 28, 28*a*, 28*b*. Flabellum lamellulosum: *natural size.*
Fig. 29, 29*a*, 29*b*. Flabellum suluense. × $1^1/_2$.
Fig. 30, 30*a*. Flabellum dens. × $2^1/_2$.
Fig. 31, 31*a*. Placotrochides dentiformis. × 4.
Fig. 32, 32*a*. Placotrochides scaphula. × 5.

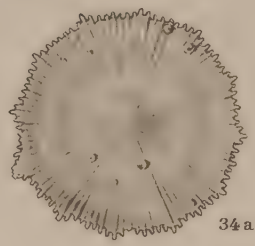
33.



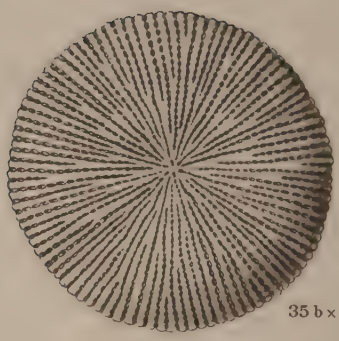
33 a × 5.



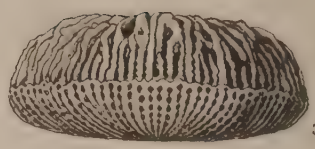
34 × 2.



34 a × 2.



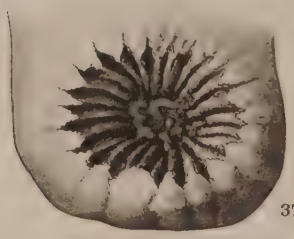
35 b × 4.



35 a × 4.

35 × 4.

36 a × 4.



37 a × 6.

36.

37.

38 × 2.

38 a × 8.

33. Pourtalosmilia dumosa, A.A.

34. Bathyactis palifera, A.A.

35. Stephanophyllia fungulus, A.A.

36. Thecopsammia fistula, A.A.

37. Coenopsammia amphelioides, A.A.

38. Coenopsammia pusilla, A.A.

PLATE V.

Fig. 33. Pourtalosmilia dumosa: *natural size.*

Fig. 33*a*. Pourtalosmilia dumosa. × 5.

Fig. 34, 34*a*. Bathyactis palifera. × 2.

Fig. 35, 35*a*, 35*b*. Stephanophyllia fungulus. × 4.

Fig. 36. Balanophyllia (Thecopsammia) fistula: *natural size.*

Fig. 36*a*. Balanophyllia (Thecopsammia) fistula. × 4.

Fig. 37. Dendrophyllia (Coenopsammia) amphelioides: *natural size.*

Fig. 37*a*. Dendrophyllia (Coenopsammia) amphelioides. × 6.

Fig. 38. Dendrophyllia (Coenopsammia) pusilla. × 2.

Fig. 38*a*. Dendrophyllia (Coenopsammia) pusilla. × 8.